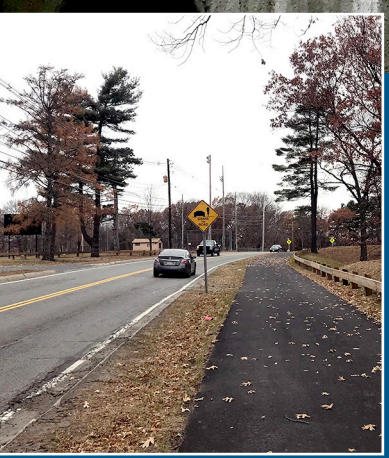
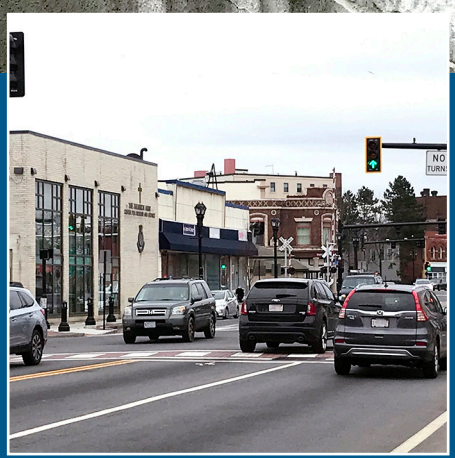
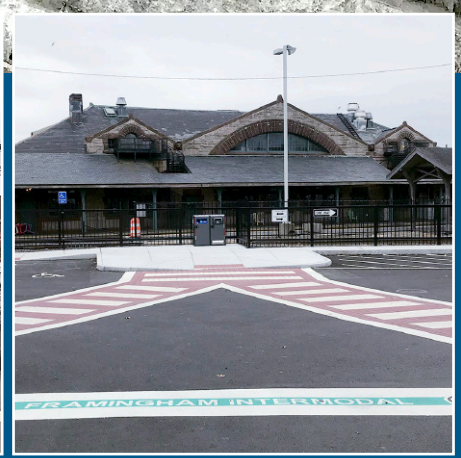
Framingham Transportation Master Plan EXISTING CONDITIONS







PREPARED BY vhb

PREPARED FOR City of Framingham, Massachusetts

December 2017

PHASE 1 - EXISTING CONDITIONS

Transportation Master Plan

Framingham, Massachusetts

PREPARED FOR

City of Framingham
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DECEMBER 2017

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1

Overview

Framingham has embarked on the development of a Transportation Master Plan (TMP). Given the size of Framingham and its complexity, this process has been subdivided into different phases with the first phase, reported herein, documenting the existing conditions of Framingham's[1] transportation network. This will form the basis of future transportation planning.

The overall TMP, along with a Comprehensive Economic Development Plan (EDP), responds to a Special Town Meeting resolution passed in May 2016, which was a directive of the Land Use Master Plan[2]. The resolution calls for a citywide study to identify contemplated development opportunities and development impacts — traffic, multifamily and other impacts — and how to mitigate them.

A master plan is a policy guide for future development describing what the community is like today and what direction it chooses to go in the future. The Division of Planning and Community Development has crafted a vision statement

[1] In April 2017, Framingham residents voted to adopt a charter establishing a city form of government. The municipality's first mayor and 11-member City Council assumed office on January 1, 2018.

[2] *Town of Framingham, Master Plan, Part 2: Land Use Master Plan*, The Cecil Group, FXM Associates, BETA Engineering, September 2012 (Updated September 2014).

with goals and policies for the Framingham Master Plan. The following transportation elements were included in this vision statement:

- Framingham's Downtown as a walkable, vibrant center with easy access to parking, the rail station and other public transportation
- Connections to Farm Pond that provide a pleasant linkage to and enhance the experience of the downtown. Additionally, have connections to surrounding neighborhoods, the hospital and institutions of higher education
- Walkable and safe communities
- Connections to public amenities forming a system of open spaces linked together by a network of walking and biking trails
- Accessible and affordable transportation for both the elderly population and the City's youth
- Address traffic issues including truck traffic in downtown, through traffic in neighborhoods and congestion on regional routes. Engage in regional traffic planning discussions with the goal of working on regional solutions
- Actively provide, support and pursue alternative modes of transportation, including the use of public transportation and walking and biking by providing the necessary infrastructure including sidewalks and bike lanes

A full copy of the vision statement is included in Appendix II.

Purpose

This Phase 1 – Existing Conditions TMP report assembles information about Framingham's current transportation conditions as a basis for future planning. It also outlines immediate and short-term strategies aimed at mitigating or improving existing deficiencies. Consistent with Master Plan objectives, the analyses for this TMP are high level and conducted citywide.

The following tasks were undertaken in the preparation of the Phase 1 TMP:

- Assemble existing inventory and collect data
- Evaluate existing conditions
- Identify existing deficiencies
- Develop short-term strategies and improvements
- Prepare Existing Conditions TMP report

The Phase 1 TMP report was developed in coordination with the Framingham Department of Public Works (DPW) with input from the Division of Planning and Community Development. It will be used not only as the first step of the full TMP, but also to inform the Economic Development Plan that will be prepared for the City.

Following the completion of Phase 1, there will be two more phases of the TMP. Phase 2 entails planning for growth and mitigating impacts and Phase 3 identifies future transportation investments to be included in the Capital Improvements Plan.

Plan Organization

The Phase 1 TMP includes the overview (Chapter 1) and nine additional chapters, as summarized below:

- Chapter 2: Planning Context
- Chapter 3: Transit Network
- Chapter 4: Automobile Network
- Chapter 5: Pedestrian Network
- Chapter 6: Bicycle Network
- Chapter 7: Safety
- Chapter 8: Parking
- Chapter 9: Bridges
- Chapter 10: Short-Term Improvement Recommendations

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2

Planning Context

Framingham is a thriving community located between Boston and Worcester, two of the largest cities in Massachusetts. It is a socially, ethnically, economically, and geographically diverse community. With a total area of 26.44 square miles, Framingham is not only home to over 70,000 residents, it is also a major employment center.

Historical Transportation Background

Framingham was settled as a farming community and incorporated in 1700. Since then it has grown into a vibrant community shaped from the start by its geography and its location relative to significant transportation routes. Originally, the Old Connecticut Path led the first explorers through the area. Later, the Boston Post Road (Route 20) was developed as a stagecoach road from Boston to New York. In 1810, the Worcester Turnpike (Route 9) was opened to connect Boston and Worcester. Rail lines were next, allowing South Framingham to develop. In 1957, the Massachusetts Turnpike (I-90) opened. Figure 1 shows Framingham's location in relation to major roadways and cities and towns.

The development of these corridors resulted in strong east-west connections, but at the expense of north-south access. North-south connections are primarily provided by local roadways with few major roadways extending the length of the City.

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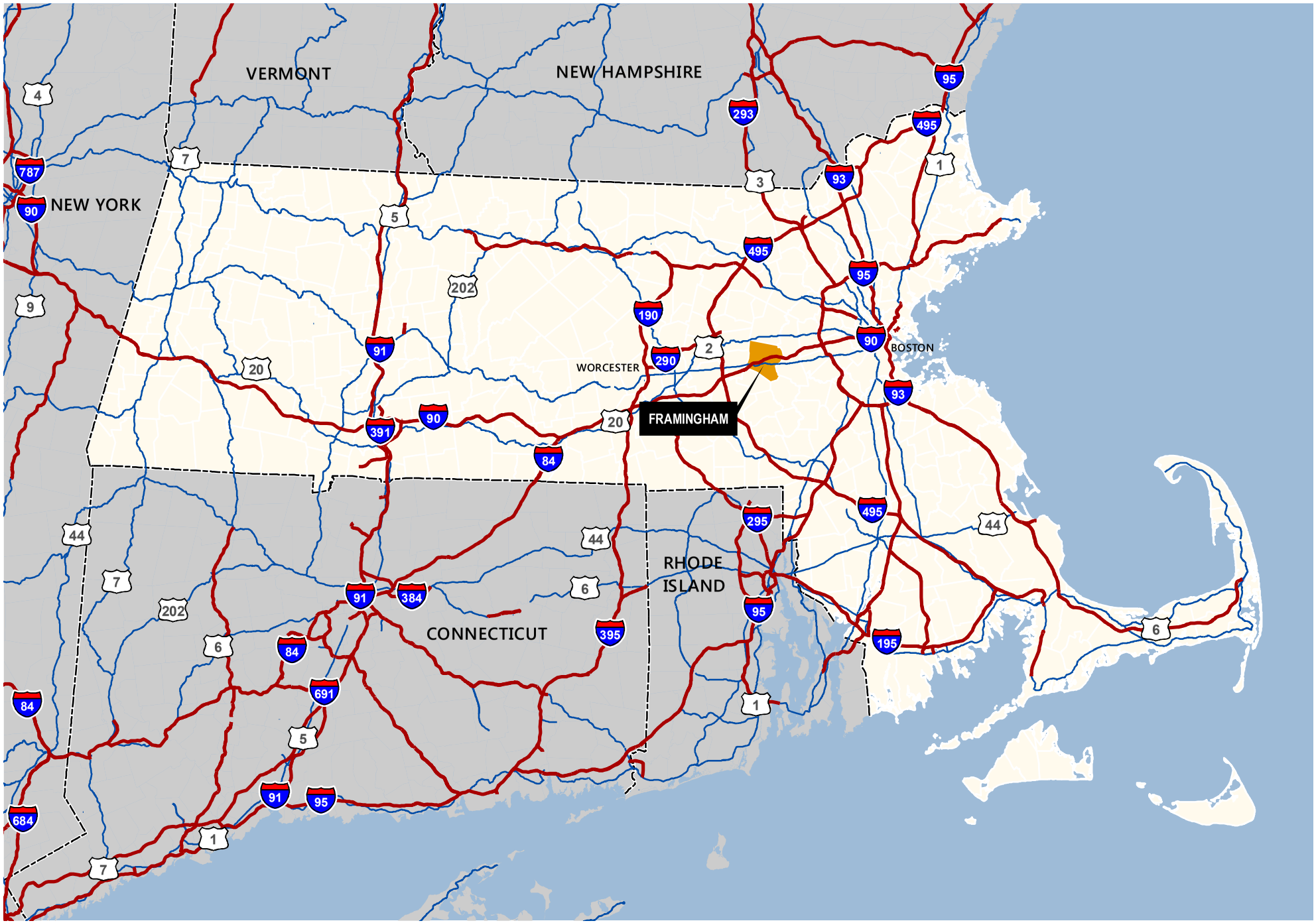
FIGURE 1: REGIONAL CONTEXT



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Framingham's origins as well as transportation trends over the years, including a vehicle-oriented emphasis, contributed to the development of its many villages and communities (see Figure 2). As transportation goals continue to evolve, Framingham's vehicular, pedestrian, bicycle, and public transit networks will constantly transform to meet the needs of its residents, employees and visitors.

Relationship to Land Use

Land use decisions, policies, and practices impact the demand on the transportation infrastructure. One the of goals and policies stated in Framingham's Land Use Master Plan[3] is to improve transportation and infrastructure by linking transportation infrastructure and land uses appropriately.

Framingham's local street network consists of many cul-de-sacs and disconnected neighborhoods with few bicycle and pedestrian connections, which contributes to congestion by funneling traffic onto arterial roadways. Additionally, some local streets are wide and lack pavement markings, which may encourage high vehicle speeds. In contrast, other local streets are narrow which limits room to adequately accommodate all modes of travel.

Framingham's commercial areas are accessed via roadways which are primarily auto-dominant. Although some of these roadways include infrastructure for non-automobile modes, the infrastructure may be perceived as unfriendly due to the roadways' characteristics, including high vehicle volumes and speeds and multiple curb-cuts. In addition, due to right-of-way constraints and physical barriers, opportunities to improve infrastructure are limited and providing improvements for one mode of transportation may negatively impact others.

Framingham's zoning by-law also impacts the transportation infrastructure by requiring large front-yard setbacks, allowing separation of land uses and low-density residential developments, and providing high minimum parking requirements. These factors create the need for more curb-cuts, separation of residential and commercial uses, and incentivize vehicle usage.

[3] *Town of Framingham, Master Plan, Part 2: Land Use Master Plan*, The Cecil Group, Inc., FXM Associates, and BETA Engineering, September 2012.

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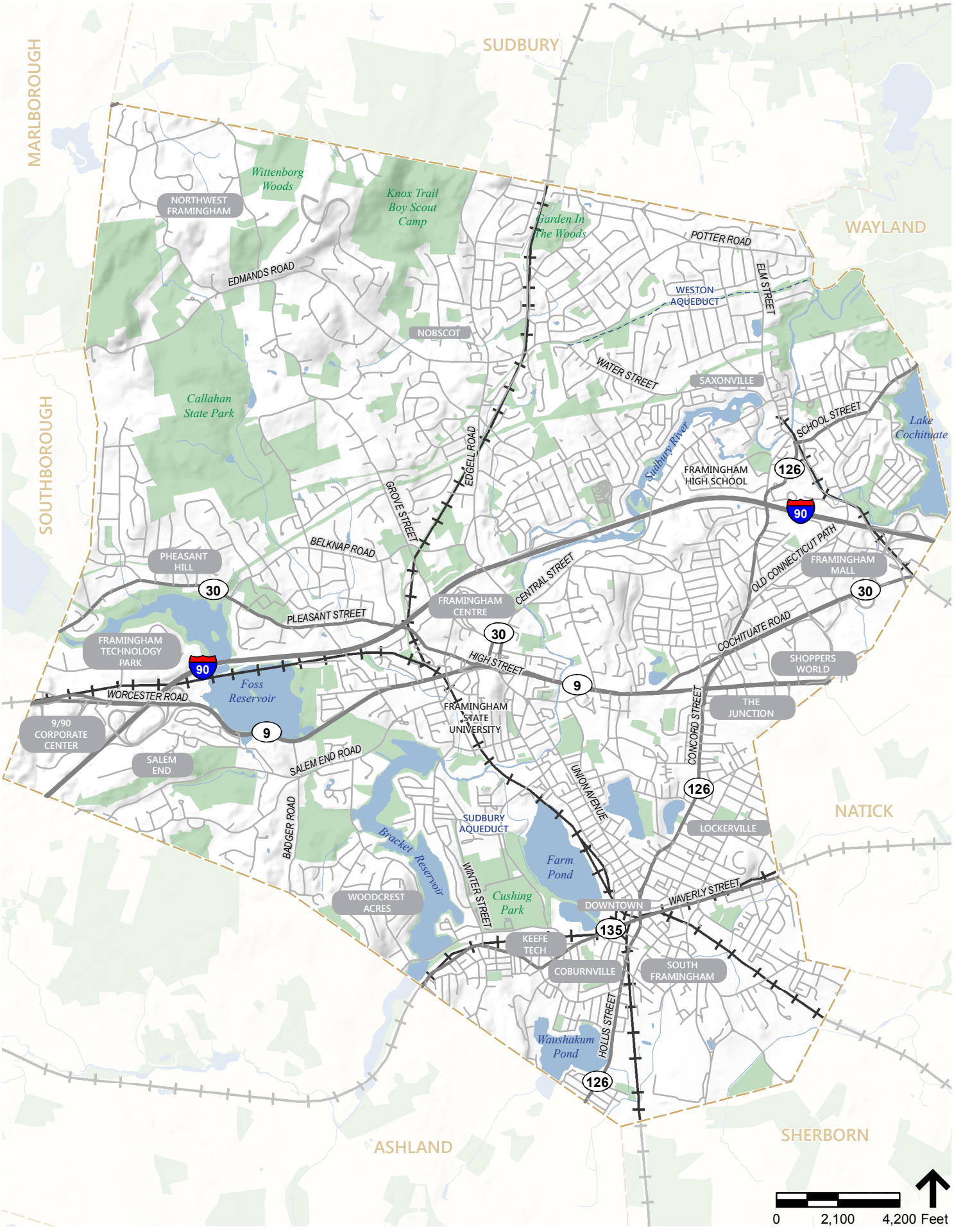
FIGURE 2: COMMUNITIES



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Transportation Trends

Due to advances in technology in recent years, transportation choices and experiences have already significantly changed and are continuing to develop with further substantial changes anticipated. Aided with advancements in mobile applications and electronic payment systems, ride-hailing (e.g., Uber and Lyft), car-sharing (e.g., Zipcar), and bike-sharing (e.g., Hubway) are widely used particularly in urban and suburban areas. Telecommuting has become more popular, and even promoted by some companies, as advancements in technology allow employees to effectively work from locations other than the office. In addition, improvements in infrastructure, such as electronic tolling and adaptive signal systems are becoming more widespread.

Looking to the future, autonomous vehicles and the transportation infrastructure needed to support it are anticipated to become common place. These technologies are actively being developed and tested now.

The recent and anticipated changes in transportation affect mode choice and vehicle ownership, among other things, and new projects should consider the anticipated impacts and build flexible projects that can easily transition as future trends develop.

Demographics

Given its diversity, understanding demographic information for different areas of Framingham is necessary to address the transportation needs within the community and specific villages and neighborhoods.

Population

The estimated population of Framingham was over 70,000 people in 2015[4]. It ranks in the top 15 most populous towns and cities in Massachusetts. The median age in Framingham is 37.7 with approximately 15% of the population being under 18 years and 19% over 60. Millennials[5] account for about 25% of the overall population. Framingham's population density, on a census block basis, is presented in Figure 3. As can be seen, Northwest Framingham is more sparsely populated, which is consistent with its rural character. Downtown and Framingham Centre, on the other hand, are moderately dense. On average, Framingham has a density of approximately 4.16 people per acre.

[4] American Community Survey 2015, 5-year estimates.

[5] Millennial is the term for the generation born roughly between 1982 and 2000.

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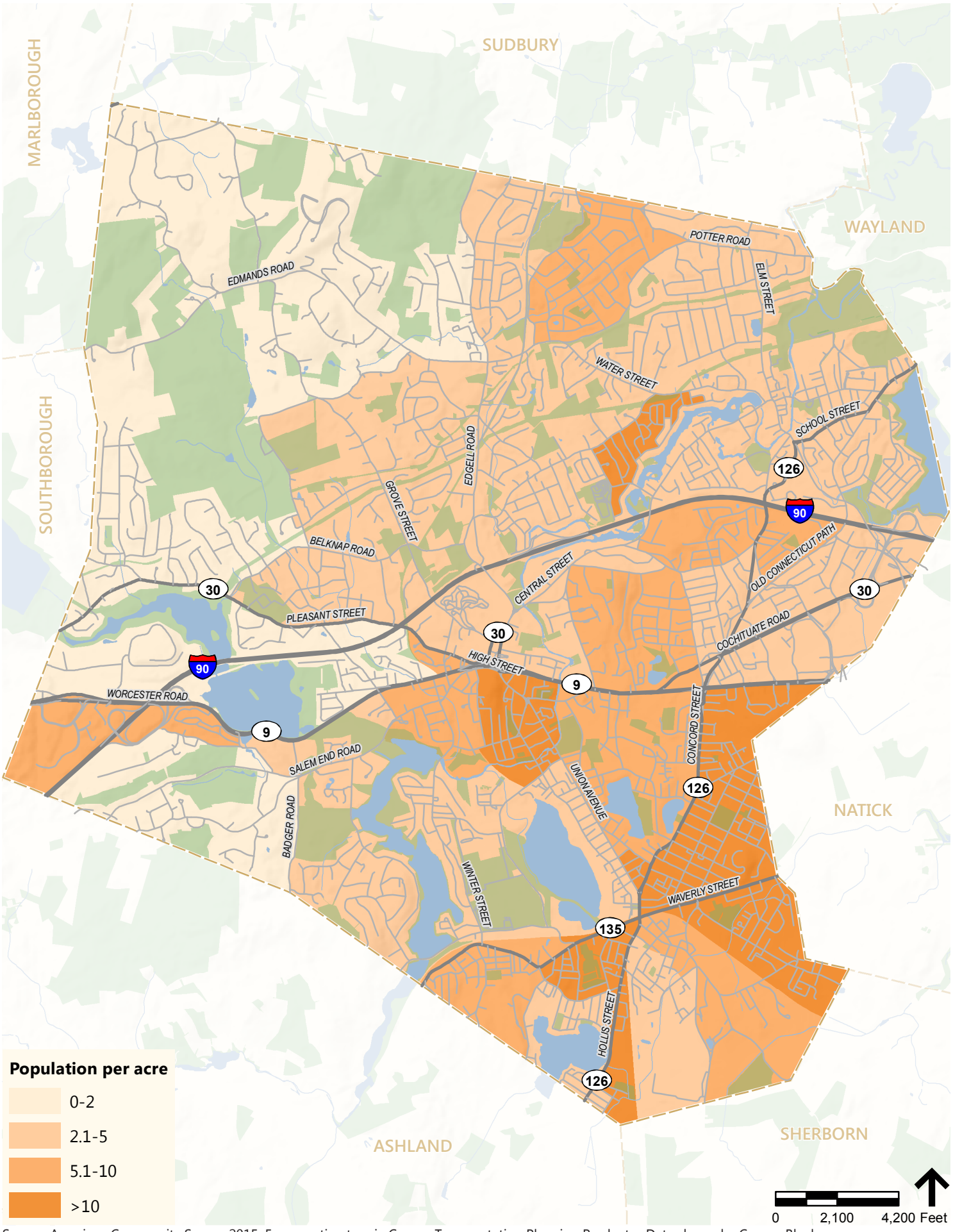
FIGURE 3: POPULATION DENSITY



Source: American Community Survey 2015, 5-year estimates via Census Transportation Planning Products. Data shown by Census Block.

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Employment

Framingham is a major employment center, with over 45,000[6]

people working in the City. Out of these, just over 25% are also Framingham residents. Figure 4 shows Framingham's job density (workers per acre) by traffic analysis zone.

Table 1 lists the major employers in Framingham. Jobs are concentrated at the Framingham Technology Park, Framingham Mall, Shoppers World and Downtown.

Table 1 Major Employers

Bose Corporation
Staples
TJX
MetroWest Medical Center
ADESA Boston
Philips Home Monitoring
SCIEX
Sanofi Genzyme
Framingham Mall
Shoppers World
Framingham State University
City of Framingham
Source: Framingham Economic Development website

[6] American Community Survey 2010, 5-year estimates via Census Transportation Planning Products.

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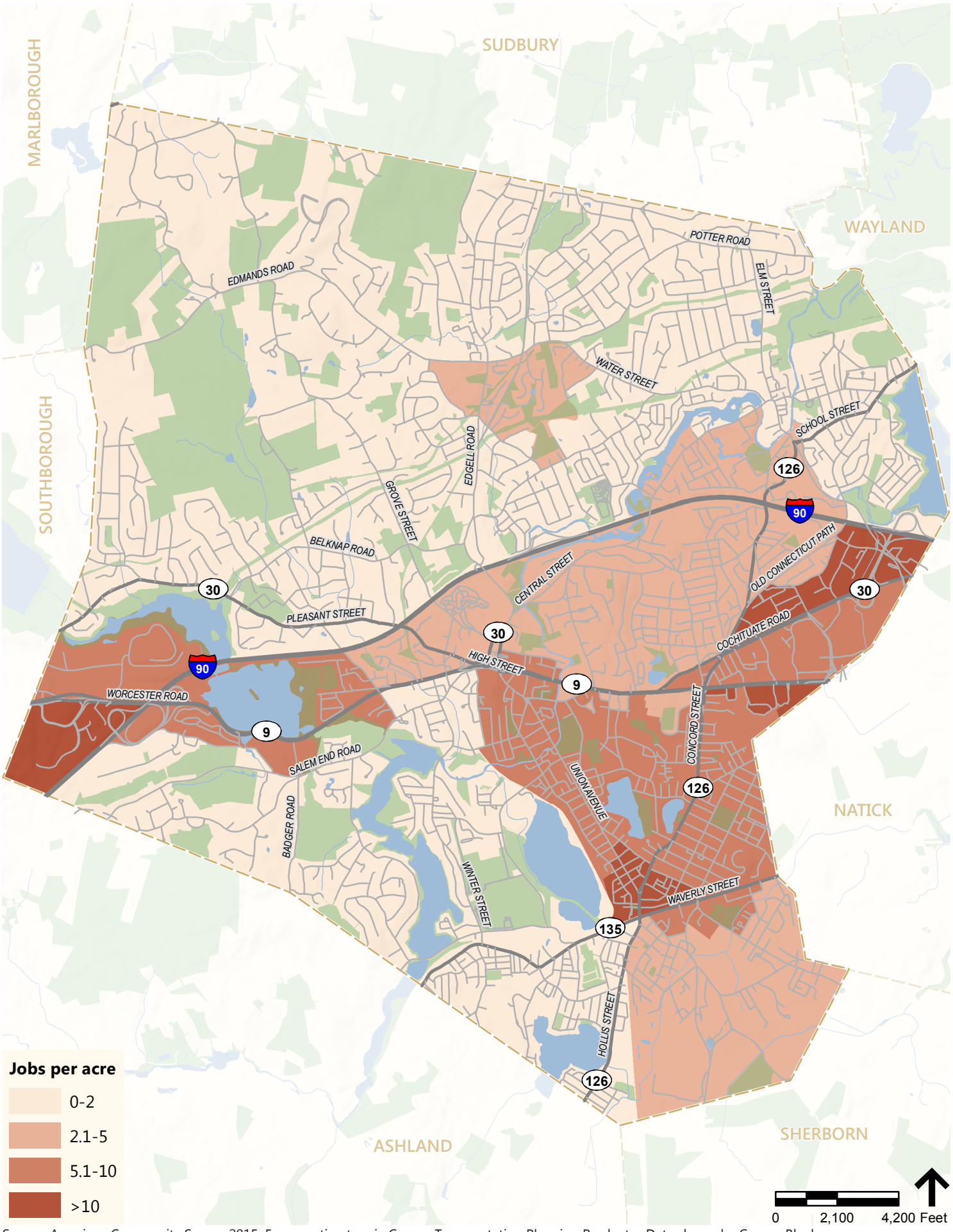
FIGURE 4: JOB DENSITY



Source: American Community Survey 2015, 5-year estimates via Census Transportation Planning Products. Data shown by Census Block.

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Income

The median household income for Framingham in 2015 is just under $70,000[7], which is in line with the state's median.

As can be seen in Figure 5, which illustrates the median household income by census blocks, the northern portion of Framingham tends to have higher median incomes than the areas to the southeast. The poverty rate in Framingham is approximately 4.3% as compared to 5.4% for the whole state.

Vehicle Ownership

Vehicle ownership per household in Framingham is over 90% on average, although some areas have vehicle ownership rates lower than 70%[7]. Vehicle ownership is often lowest in lower income areas. For instance, in the area with the lowest vehicle ownership rates, the median household income is under $30,000. Figure 6 illustrates the vehicle ownership percentages for Framingham.

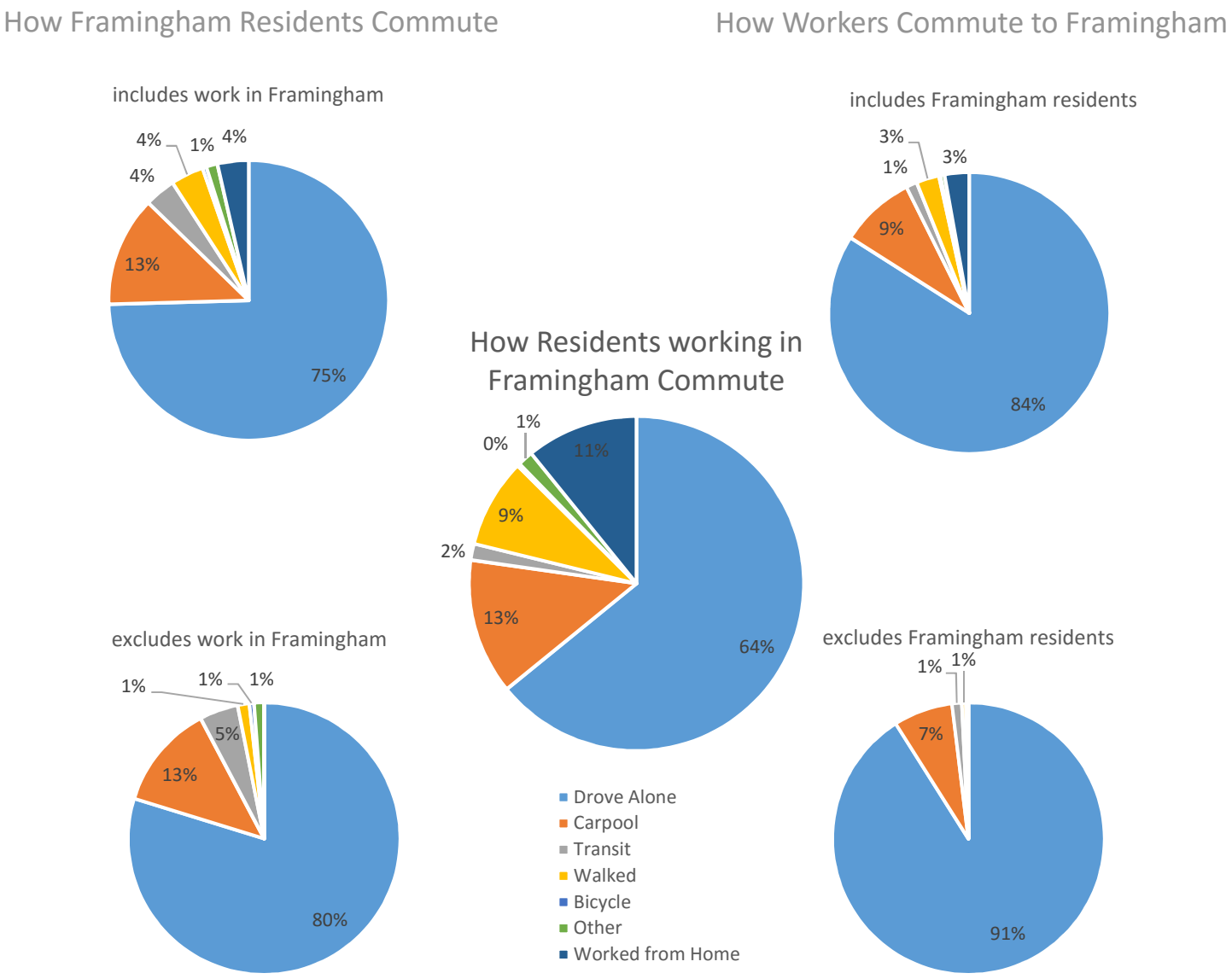
Commuting Choices

The majority of residents rely on a personal vehicle to travel to work. As can be seen in Graphic 1, three-quarters of residents drive alone to work, although if their job is in Framingham this share is reduced with more people walking or working from home. When residents work in other towns/cities, 80% will drive alone with another 13% carpooling. Transit is used by between 2% and 5% of residents, depending on the location of their work. As expected, buses are used by 100% of residents traveling via transit to jobs in Framingham. This number drops to only 15% when traveling to work outside Framingham, with a heavier use of the commuter rail[7].

Workers come to Framingham from all parts of the state. While many jobs in Framingham are staffed with Framingham residents, Boston, Natick, Marlborough, Ashland, Worcester, and Milford each contribute over 1,000 employees to Framingham businesses. Similar to commuters from Framingham, commuters to Framingham mostly drive alone. Over 90% of those who work in Framingham but reside outside of Framingham drive alone, while another 7% carpool (see Graphic 1). Transit and walking each contribute to about 1% of their mode share[5].

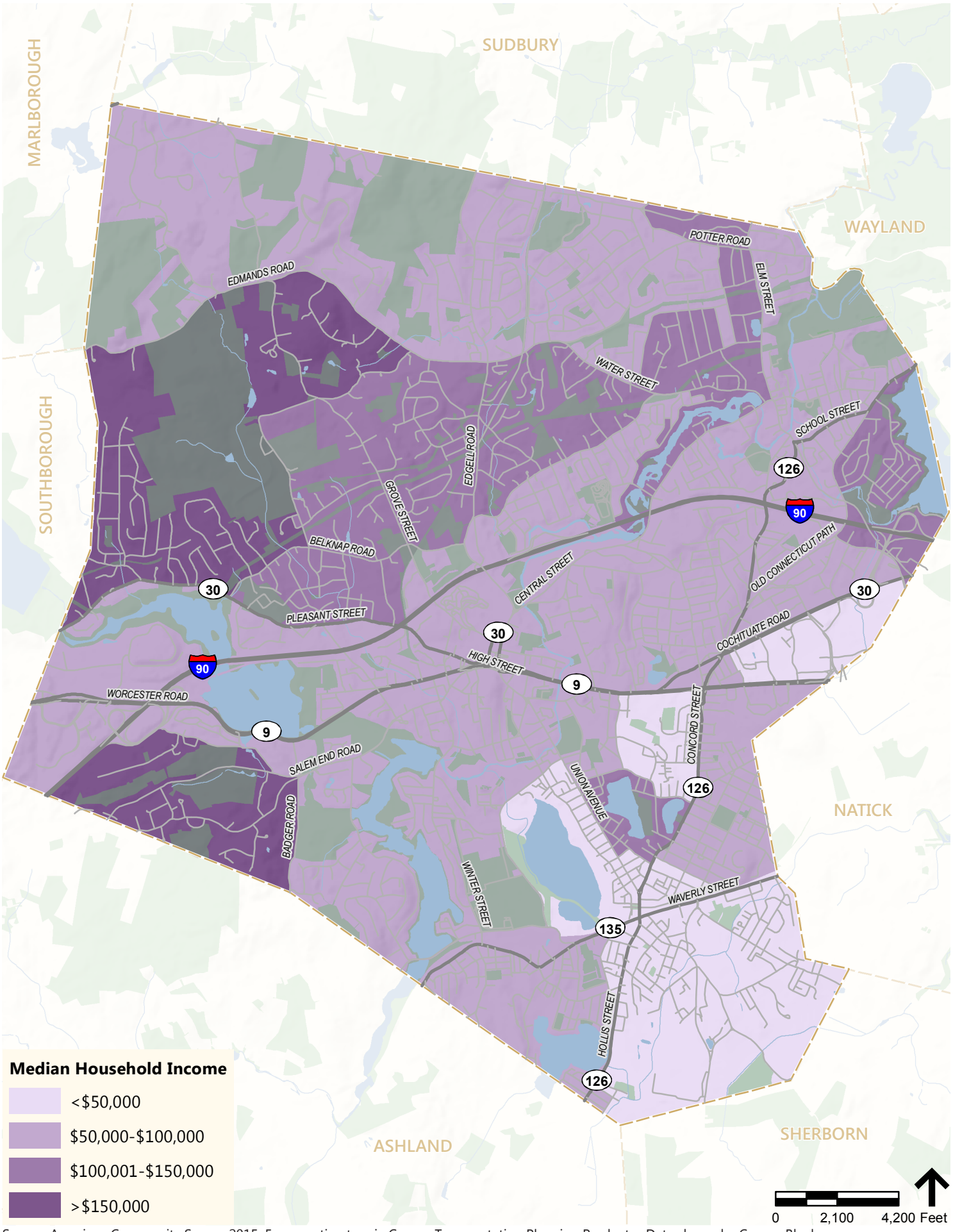
[7] American Community Survey 2015, 5-year estimates via Census Transportation Planning Products.

Graphic 1 Mode Share



Source: American Community Survey 2010, 5-year estimates via Census Transportation Planning Products.

FIGURE 5: MEDIAN HOUSEHOLD INCOME



Source: American Community Survey 2015, 5-year estimates via Census Transportation Planning Products. Data shown by Census Block.

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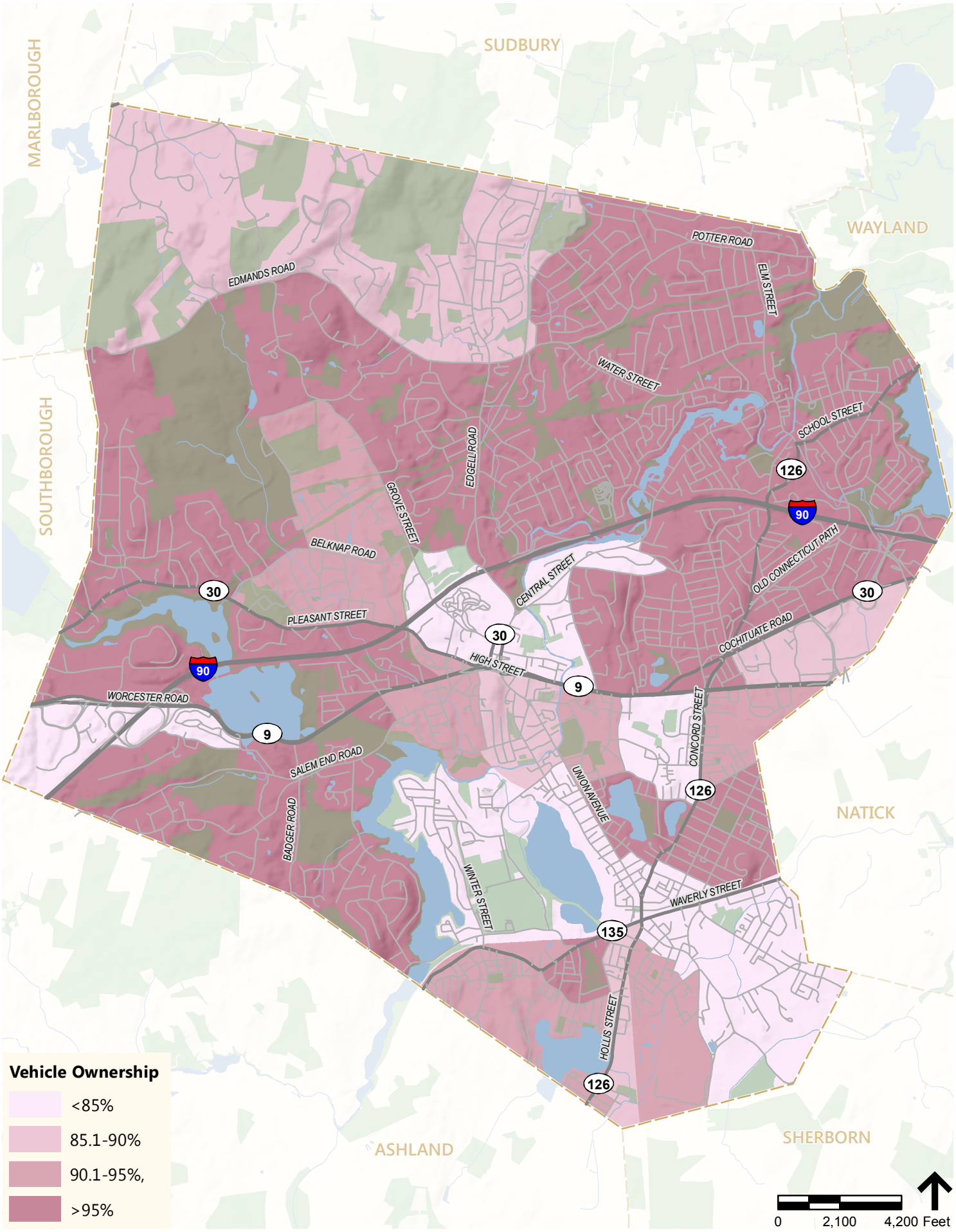
FIGURE 6: VEHICLE OWNERSHIP



Source: American Community Survey 2015, 5-year estimates via Census Transportation Planning Products. Data shown by Census Block.

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3

Transit Network

Framingham is served by transit service provided by the MetroWest Regional Transit Authority (MWRTA), by the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail and by Amtrak. Framingham also has a number of shuttle services including Logan Express, university shuttles and corporate shuttles.

MetroWest Regional Transit Authority

The MWRTA provides public transportation for communities in the I-495/MetroWest Corridor. Operations are based in Framingham, with Downtown Framingham being the hub for most fixed routes. Twelve of MWRTA's 14 fixed routes serve Framingham. The fixed route service uses a combination of designated bus stops and a "flag down system"[8]. The fixed route service provides Framingham residents not only with transportation within Framingham, but as far west as Marlborough, as far east as Newton, as far north as Sudbury, and as far south as Milford. MWRTA uses Google Transit and a real-time bus tracker app to assist trip planning. Figure 7 shows the MWRTA routes and service area.

[8] Allows buses to stop anywhere along their routes (where it is safe to do so) to pick up passengers.

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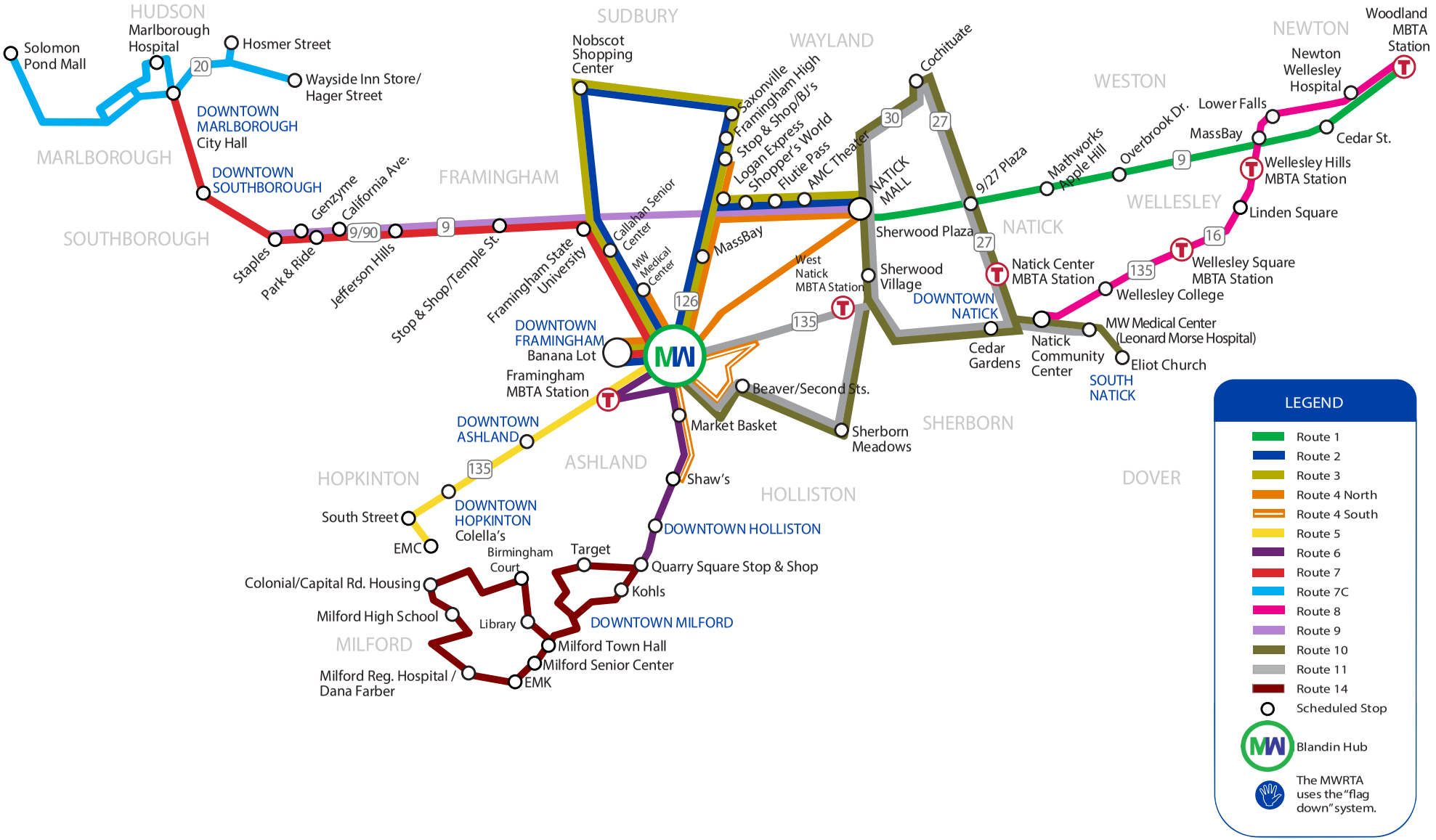
FIGURE 7: MWRTA SYSTEM MAP



Source: MWRTA, version 1.17.

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As seen in Table 2, no Sunday service is offered, and only half of the routes offer Saturday service. Weekday service starts generally between 5:30 AM and 6:30 AM and ends between 7:00 PM and 8:30 PM; no late-night service is provided. On Saturdays, service starts between 8:00 AM and 9:30 AM and ends between 5:00 PM and 6:00 PM.

The MWRTA operates paratransit service, the MetroWest RIDE, for persons who cannot independently access the fixed route buses. The MWRTA also operates some point-to-point shuttles. The Framingham Commuter Shuttle connects the Framingham train station with key employment locations in the City. The Boston Hospital shuttle provide midweek service to several Boston area hospitals.

Table 2 MWRTA Bus Routes

	Route 1 (M-F)	Blandin Hub, Concord/Howard St, Flutie Pass, Natick Mall, Mathworks Apple Hill, Overbrook, Woodland T Station
	Route 2 (M-F, Sat)	Blandin Hub, Banana Lot, MW Medical Center, Callahan Center, Framingham Centre, Vernon/Pleasant St, Edmands House, Shillman House, Nobscot Shopping Center, Pinefield Shopping Center, Framingham High School, Stop & Shop, Target/Whittier St, Shoppers World, Natick Mall, Kohl's, Rt. 30 & Rt. 126 Concord St, Arsenal Rd, MassBay Community College, Rose Kennedy Lane, Lincoln/Pearl St
	Route 3 (M-F, Sat)	Blandin Hub, Banana Lot, MassBay Community College, Rose Kennedy Lane, Rt. 30 & Rt. 126 Concord St, Walmart, Sherwood Plaza, Natick Mall, Shoppers World, Target/Whittier St, Stop & Shop, Framingham High School/A St, Pinefield/Water St, Nobscot Fire Station, Edmands House, Shillman House, Framingham Centre, Callahan Center, MW Medical Center, Lincoln/Pearl St
	Route 4N (M-F, Sat)	Blandin Hub, Porter Rd, MathWorks Lakeside, Natick Mall, Shoppers World, Kohl's, Stop & Shop/BJ's Wholesale Club, Walmart, Route 9 West/Beacon St, Fairbanks/Concord St, Concord St/Anzio Rd, Concord/ Lincoln St, MW Medical Center, Union Ave/Lincoln St, Mount Wayte/ Franklin St, Banana Lot
	Route 4S (M-F, Sat)	Blandin Hub, Irving St, MCI Framingham, Irving/Leland St, Beaver/Second St, 37 Waverly St, Tarelli Terrace/Beaver Park Rd, Arlington/Waushakum St, Memorial House, Market Basket/Hollis St, Shaw's Market, Hollis/Irving St
	Route 5 (M-F)	Blandin Hub, Framingham MBTA Station, Bethany Health Care Center, Homer/Main St, Ashland House, Ashland Jr. High School, Ashland Community Center, Rt. 85/Rt. 135, Golden Pond, Price Chopper, South/ Hayward St
	Route 6 (M-F)	Blandin Hub, Framingham MBTA Station, Market Basket, Shaw's, Washington St/Cong. Church, Cutler Heights, Missions Springs, Quarry Square Stop & Shop, Spruce St, Milford Town Hall, Dunkin Donuts, Beaver St, Holliston Public Library
	Route 7 (M-F, Sat)	Blandin Hub, Banana Lot, Framingham State, Stop & Shop Temple St, Jefferson Hills Complex, Staples, Route 9 Park 'n Ride, Downtown Southborough, Main St (Marlborough), 7-11 Broad St, Marlborough Senior Center, Bolton St, Chapel Hill, Howard St

	Route 8 (M-F)	Blandin Hub, Natick Community Center, Wellesley College, Weston Rd/Manor Ave, Fells Market, Crest Rd (MBTA), Wellesley Hills (MBTA), Lower Falls, Newton-Wellesley Hospital, Woodland Station, MassBay Community College, Weston Rd/Manor Ave, Linden St, Wellesley Community Center, Cameron St, Whole Foods, Cross St.
	Route 9 (M-F)	Blandin Hub, Concord/Howard St, Natick Mall, Flutie Pass, Shoppers World, Rt. 9/Rt. 30, Framingham Centre, Jefferson Hills, Staples, Westborough, California Ave, Framingham MBTA, High St (FSU)
	Route 10 (M-F)	Blandin Hub, Irving/Leland St, Kendall Ave, Sherborn Meadows, Kendall Lane, Natick Crossings Plaza, Roche Bros, Cedar Terrace Upper Lot, Cedar Gardens, Coolidge Gardens, Natick Commons, Leonard Morse Hospital, Eliot Church, Natick Community Center, Moran Park (MBTA), 9/27 Plaza at Panera Bread, Dairy Queen, Shawmut Ave, Wayland Bent Park, West Plain/Rt. 126, Speen St/Rt. 30 TJX, Natick Mall, Sherwood Plaza, Sherwood Village
	Route 11 (M-F, Sat)	Blandin Hub, Natick Crossings Plaza (MBTA), Sherwood Village, MathWorks Lakeside, Natick Mall, Sherwood Plaza, Speen St/Rt. 30 TJX, Rt. 126/West Plain, Wayland Bent Park, Shawmut Ave, Rt. 27/Rt. 30, 9/27 Plaza at Panera Bread, Rt. 27/Kansas St, Rt. 27/Federal (MBTA), Natick Commons, Leonard Morse Hospital, Natick Community Center, Coolidge Gardens, Cedar Terrace Upper Lot, Cedar Gardens, Roche Bros., Speen/Mill/Pond St, Sherborn Meadows/Kendall Ave, Beaver/Second St
	MassBay Shuttle	Wellesley Hills Campus, Framingham Campus, Natick Mall
	Framingham Commuter Shuttle	Banana Lot (Framingham MBTA), designated work areas in Framingham
	Boston Hospital Shuttle (Tu, Wed, Th)	Blandin Hub or 37 Waverly St, Natick VFW Post 1274, West Roxbury V.A., Jamaica Plain V.A, N.E. Baptist, Brigham and Women's, Dana Farber, Beth Israel, Joslin Clinic, New England Deaconess. Framingham residents have option of being picked up and dropped off at their homes.
Source: MWRTA website, accessed March 2017.		

Rail

Amtrak

Framingham is served by Amtrak which provides regional rail service to the northeast via Boston and Springfield. The station is located at 417 Waverly Street and is shared with the MBTA Commuter Rail. The station provides 166 parking spaces with additional parking available at the Banana Lot (off Howard and Concord Streets, near 2 Franklin Street). Parking costs $4 per day. Schedules and fares vary based on destinations and season.

MBTA Commuter Rail

Framingham is served by the MBTA Framingham/Worcester commuter rail line. It has one station located at 417 Waverly Street, which is shared with Amtrak. Fares vary between $2.25 to $12.50 depending on the travel zones.

A total of 52 trains stop on weekdays at Framingham Station – 26 inbound and 26 outbound. On weekends, 18 trains stop (9 inbound and 9 outbound). Service occurs between approximately 5:30 AM and 1:00 AM on weekdays and 5:30 AM and 11:30 PM on weekends.

An alternative Framingham/Worcester rail line station is West Natick Station, as it is located near the eastern border of Framingham. West Natick Station is categorized as a Zone 4 station versus Framingham Station which is in Zone 5. Therefore, fares are slightly lower at West Natick Station when traveling to/from Boston and slightly higher when traveling to/from Worcester as compared to Framingham Station. A total of 178 parking spaces are available.

Shuttles

Logan Express

The Massachusetts Port Authority (Massport) operates the Logan Express which provides shuttle service for passengers and employees between suburban locations and Logan Airport in Boston. Logan Express has four suburban locations, in Framingham, Braintree, Woburn, and Peabody. The Framingham lot is located at 11 Burr Street Extension and provides 625 parking spaces. Parking costs $7 per day and adult fares are $12 one-way and $22 roundtrip. Reduced fares are available for seniors, children, and airport employees.

Travel time between Logan Airport and the Framingham Logan Express lot is approximately 30 to 45 minutes. On weekdays, service is provided every half-hour from 4:00 AM to 11:00 PM. On Saturdays, service is provided every hour from 6:00 AM to 10:00 PM. On Sundays, service is provided every hour from 6:00 AM to 12:00 PM (noon) and every half-hour from 12:00 PM (noon) to 11:00 PM. Early bird trips are also provided on weekdays and weekends.

Corporate

Private shuttles are operated by some companies located in Tech Park and the 9/90 Corporate Center, which provide service between satellite parking facilities, the companies' other campuses, and the Framingham MBTA Commuter Rail Station. Additionally, shuttles operate internally within Tech Park.

Framingham is a served by the MetroWest/495 Transportation Management Association (TMA) which focuses on transportation-related issues in the MetroWest region and sustainable commuting solutions to the large employers located within

the region[9]. Currently, no shuttles are operated by the TMA, however there is a desire to implement them in the future.

University

MassBay Community College partners with the MWRTA to provide free shuttle services between the MBTA Riverside Station, MassBay's Wellesley Hills campus, and MassBay's Framingham campus when classes are in session. Service between Riverside and the Wellesley Hills Campus starts at 7:15 AM and ends at 10:20 PM. Between the Wellesley Hills and the Framingham campuses service starts at 8:45 AM and ends at 5:45 PM. There is no Saturday or Sunday service.

Framingham State University offers a shuttle bus service called the RAM TRAM. The shuttle has stops at the FSU Campus, Natick Mall, Shoppers World, Target and the Framingham commuter rail station. Service starts at 3:15 PM and ends at 11:15 PM on weekdays. On weekends, it starts at noon and ends at 9:00 PM.

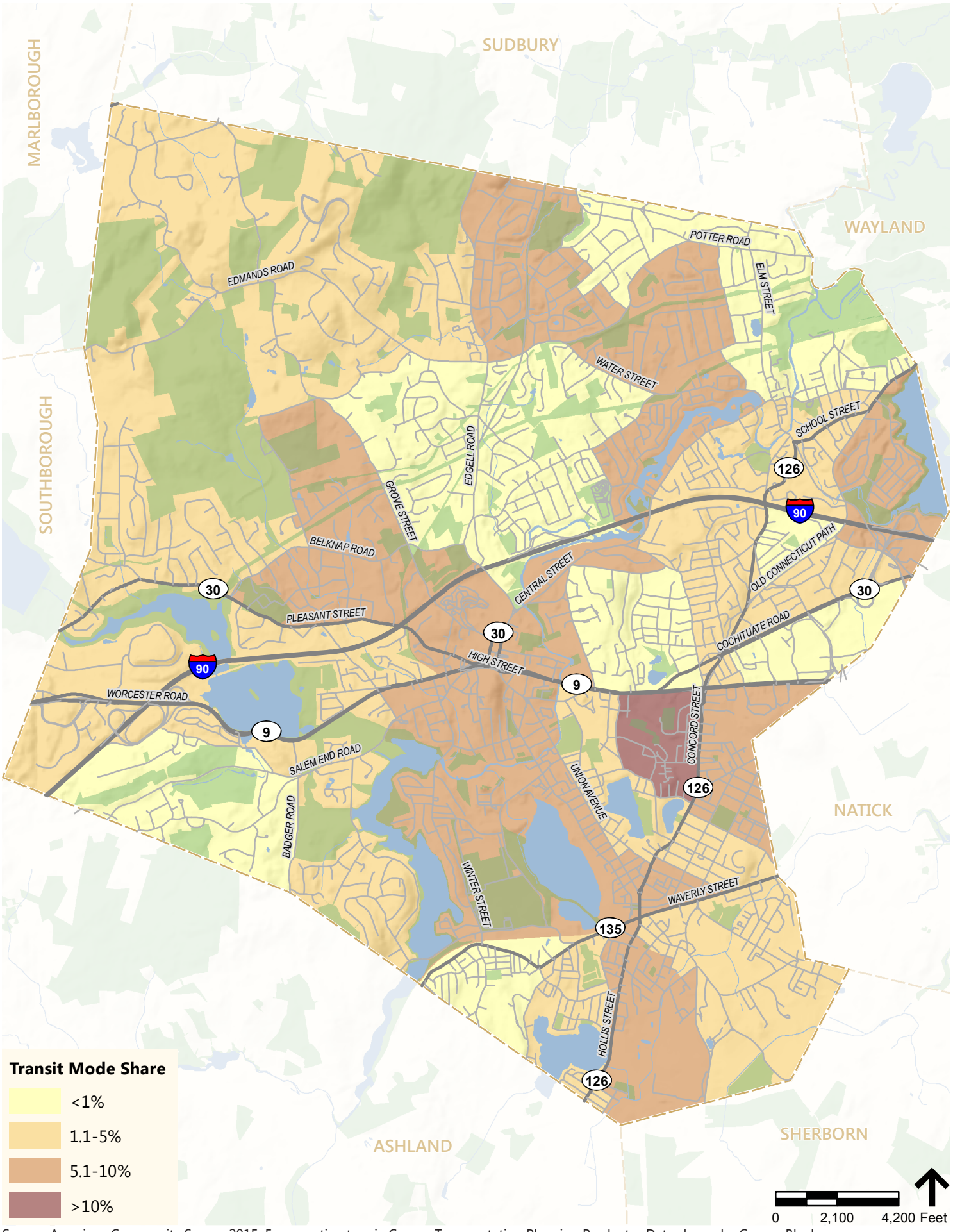
Transit Usage

While Framingham is well served by transit with several bus lines, a very active commuter rail station and connections to the MBTA's rapid transit system (via transfers at the MBTA Green Line D Branch Woodland Station), overall only 4% of Framingham residents use transit to travel to work[10]. Figure 8 illustrates Framingham's transit mode share.

[9] MetroWest/495 TMA website, accessed November 2017.

[10] American Community Survey 2010, 5-year estimates via Census Transportation Planning Products.

FIGURE 8: TRANSIT MODE SHARE



Source: American Community Survey 2015, 5-year estimates via Census Transportation Planning Products. Data shown by Census Block.

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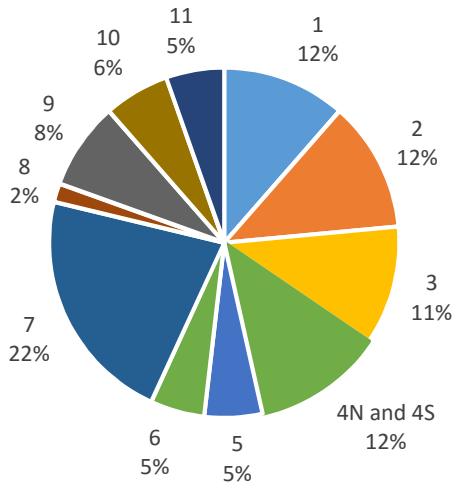
Ridership

Annual ridership on MWRTA bus routes systemwide was approximately 325,000 riders, with more than half the boardings (183,500) taking place at stops in Framingham[11]. The MWRTA Route 7, which connects Downtown to Technology Park, experiences the highest ridership, with over 70,000 yearly riders. Within Framingham, the Framingham MBTA (Rear)/Banana Lot stop is the most utilized, with almost 50,000 yearly boardings. Other highly utilized stops are located near Downtown and office and retail centers. Graphic 2 and Figure 9 show the MWRTA annual ridership by bus route systemwide and Figure 10 shows annual boardings at fixed stops in Framingham.

Graphic 2 MWRTA Annual Ridership by Route



Source: MWRTA CY2016 ridership data.

According to the MBTA's latest statistics[12], approximately 1,300 inbound (towards Boston) boardings were observed on an April 2013 weekday at Framingham Station and 1,120 boardings at West Natick Station. Framingham Station has the second highest boardings of the Framingham/Worcester line (Worcester is first), and West Natick Station has the third highest. Framingham Station is also in the top 10 highest inbound boardings among the entire MBTA commuter rail system.

[11] Ridership data provided by MWRTA for CY2016.

[12] MBTA 2014 Blue Book, 14th Edition.

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FIGURE 9: MWRTA ANNUAL SYSTEMWIDE RIDERSHIP BY ROUTE

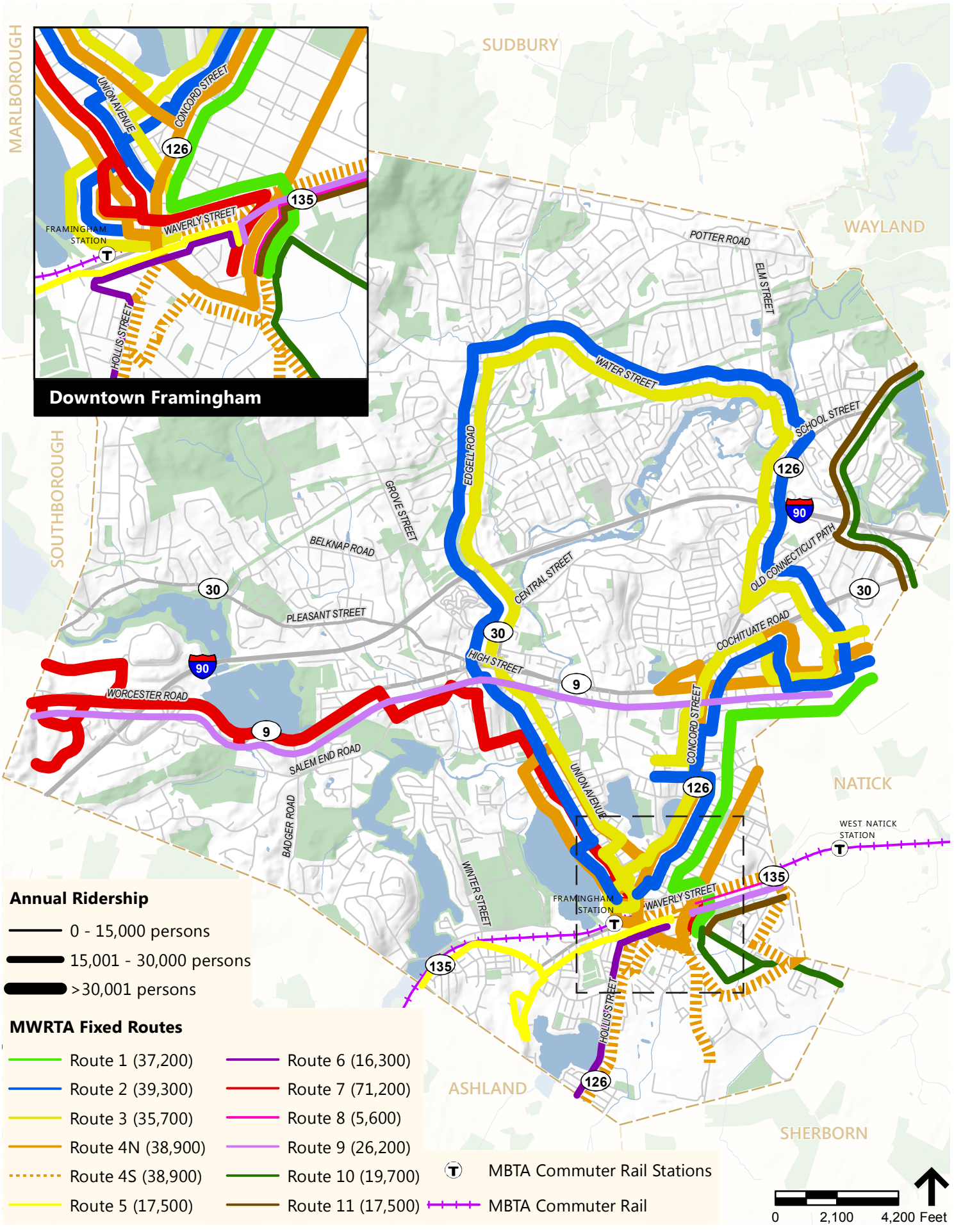

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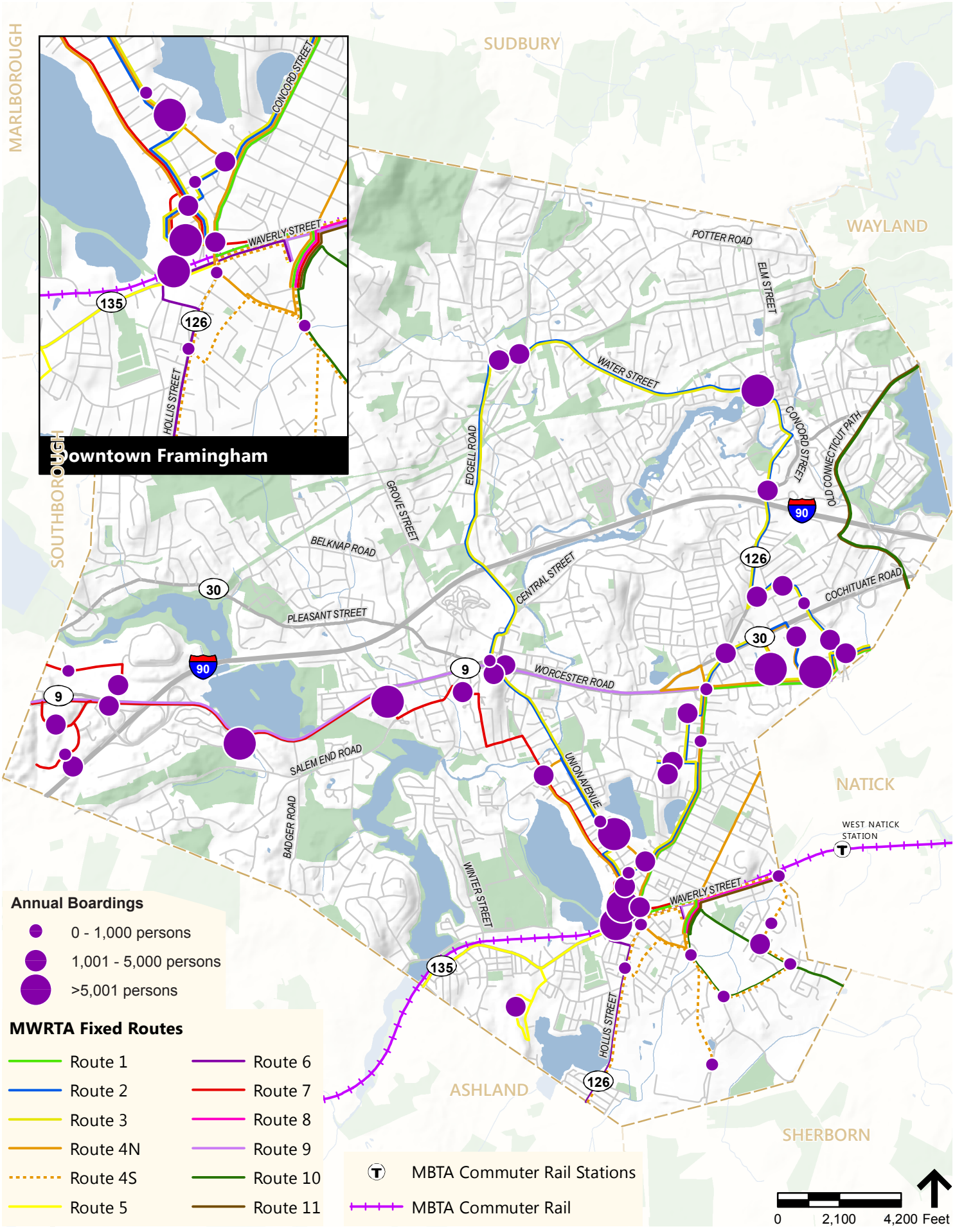
FIGURE 10: MWRTA ANNUAL BOARDINGS BY STOP



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Transit Network Deficiencies

Although Framingham is served by transit service provided by the MWRTA and the MBTA Commuter Rail, some transit-related deficiencies present access, reliability and convenience impacts. The following summarize areas where the transit network could be improved:

- MWRTA bus on-time performance (arrival of the bus at the stop within ten minutes of its scheduled time) on all routes is approximately 62%[13].
- MWRTA routes have no weekday service after 8:30 PM, only half the routes operate on Saturdays, and there is no service on Sundays.
- Many of the most frequently used MWRTA bus stops in Framingham are lacking amenities such as bus shelters and ADA compliant facilities.
- The MWRTA Bus Route 7, which has the highest yearly route ridership and provides a connection between the Framingham MBTA commuter rail station and Framingham Technology Park, does not provide service that consistently coincides with the MBTA commuter rail scheduled arrival and departure times during the peak periods.
- The MBTA commuter rail Framingham/Worcester Line is currently at or approaching capacity on several of its peak-period trips.
- The MBTA commuter rail Framingham/Worcester Line provides limited service for the non-peak direction during peak periods.
- The MWRTA buses are not full-size city buses, which may make the service be perceived less attractive due to the narrow aisles and limited space.
- Limited services provided by the MetroWest/495 TMA

[13] Arrival time data provided by MWRTA for CY2016. Ten-minute threshold based on MWRTA service advisory.

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4

Automobile Network

Framingham has a fairly traditional suburban transportation system, with vehicular travel as the primary mode. Due to its origins along colonial routes between Boston and communities in Connecticut and New York, Framingham developed strong east-west connections, but these came at the expense of north-south access.

The majority of households in Framingham (over 90%) own a vehicle, and the majority of residents rely on a personal vehicle to travel to work (either driving alone or carpooling)[14]. Figure 11 shows the drive-alone mode share throughout the City. Downtown, Framingham Centre, Framingham Technology Park and the Framingham Mall/Shoppers World have the lowest drive-alone-to-work mode share.

[14] American Community Survey 2010, 5-year estimates via Census Transportation Planning Products.

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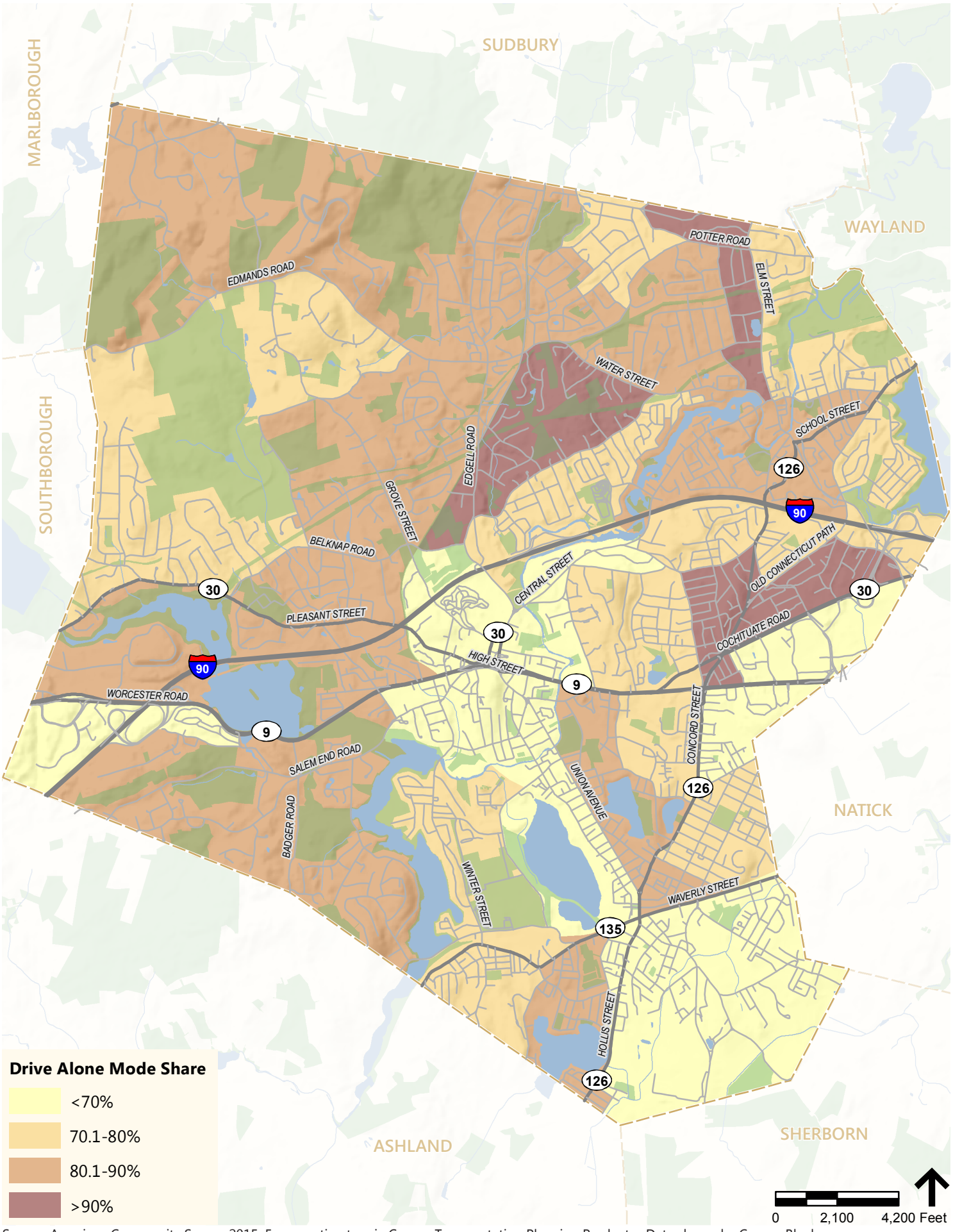
FIGURE 11: DRIVE ALONE MODE SHARE



Source: American Community Survey 2015, 5-year estimates via Census Transportation Planning Products. Data shown by Census Block.

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Transportation Study Area

The MassPike (I-90) and four state-numbered roads, Route 9 (Worcester Road), Route 30 (Pleasant Street/Cochituate Road), Route 126 (Hollis Street/Concord Street) and Route 135 (Waverly Street), traverse the City. Exits 12 and 13 on the MassPike serve as focal points for large-scale commercial retail and business park developments. Routes 9 and Route 30 also provide east-west access through the City and are significant regional retail corridors with convenient access to the MassPike, while Route 135 serves as a primary east-west arterial through downtown Framingham. Route 126 connects Framingham in a north-south direction and functions as downtown's "Main Street".

Representative intersection locations and corridors were selected throughout the many Framingham neighborhoods to determine typical traffic operations within the City. This study area was determined in consultation with City staff to ensure that it covers all major corridors and areas of concern. The results of the analyses at these specific locations are used to determine high-level issues citywide. Figure 12 illustrates the study intersections and corridors.

Traffic Volumes

Daily and peak hour traffic counts were compiled from existing reports and supplemented through an extensive data collection effort in March and April 2017. The counts were conducted for the morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) peak periods at all study area intersections, and continuously for 24 hours at the study area corridors.

Existing average daily traffic is summarized in Figure 13. As can be seen, Route 9, Route 30 (Cochituate Road), and Route 126 generally experience the highest daily traffic volumes while corridors within Northwest Framingham have the lowest. As illustrated in Figure 14, the roadways that experience the highest daily traffic also carry higher volumes of truck traffic. Detailed peak hour traffic volume networks as well as the raw counts are provided in Appendix I and Appendix III, respectively. Corridor volumes are described in more detail in the next section.

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FIGURE 12: STUDY AREA INTERSECTIONS AND CORRIDORS

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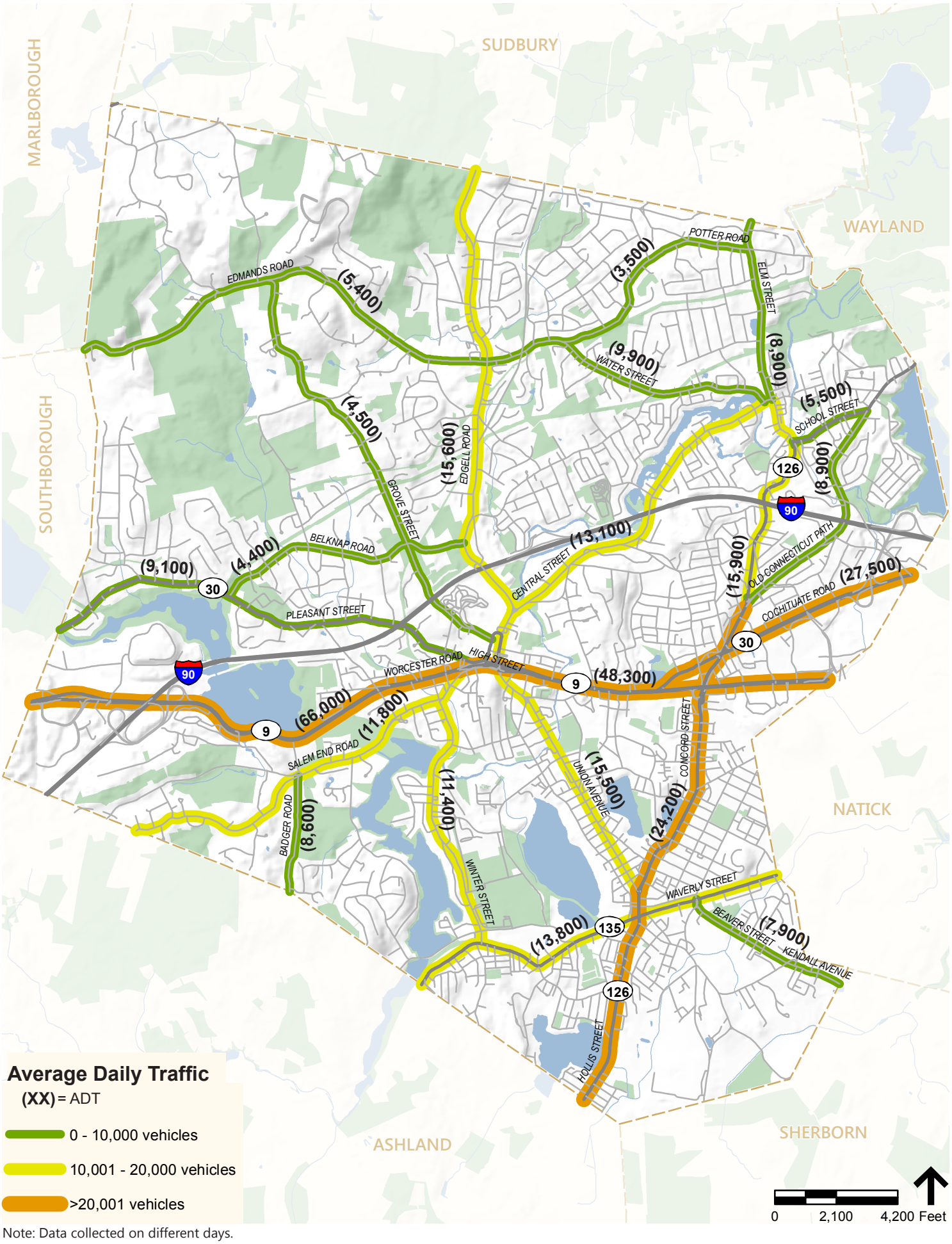
FIGURE 13: AVERAGE DAILY TRAFFIC



Note: Data collected on different days.

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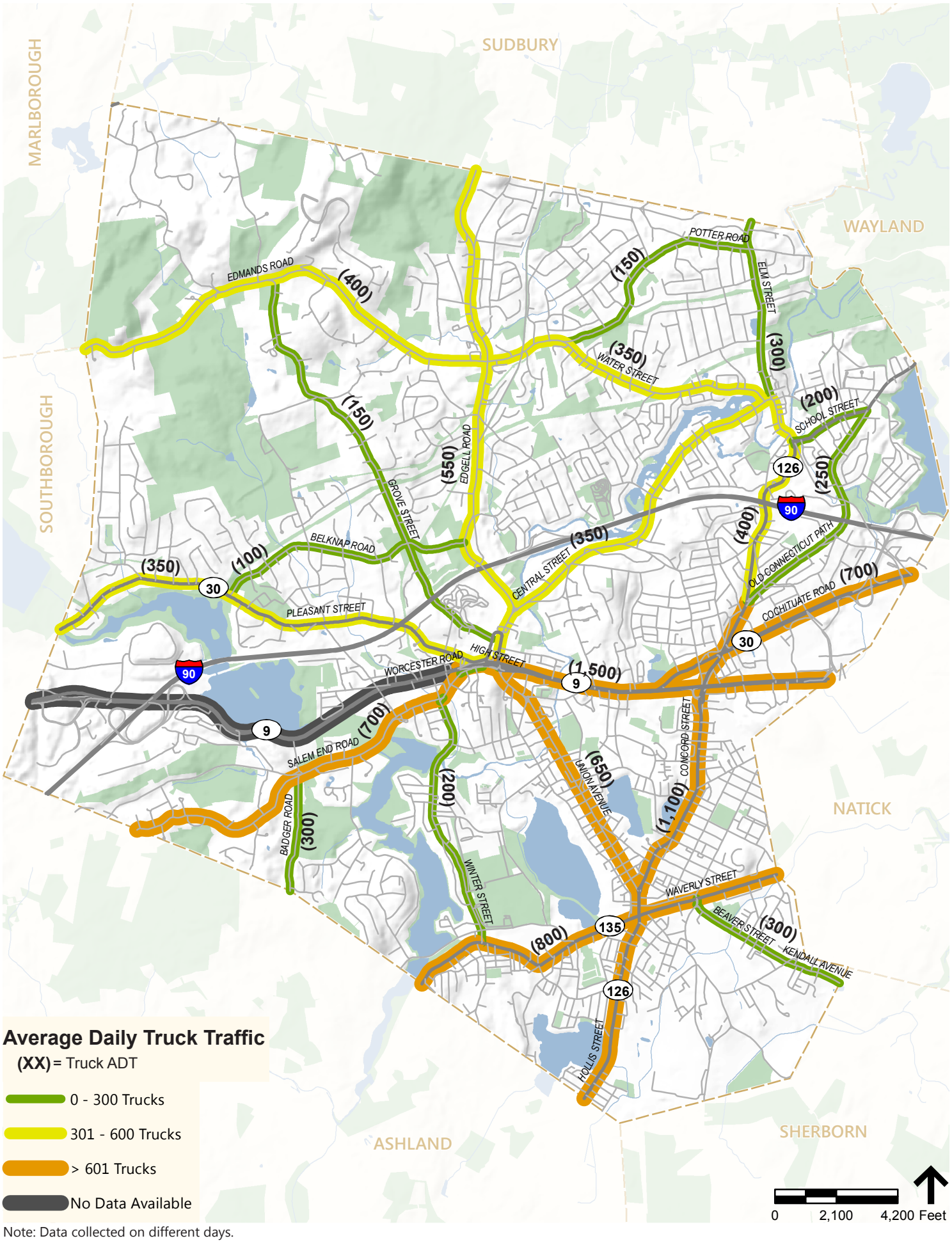
FIGURE 14: AVERAGE DAILY TRUCK TRAFFIC



Note: Data collected on different days.

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Automobile Infrastructure

Roads within Framingham are primarily residential with wider streets in the neighborhood centers and commercial or retail areas. Figure 15 shows the jurisdiction of Framingham's roadways. Most of the roads within Framingham are "City accepted roads", that is, roads for which the City is responsible for maintenance and which are eligible for various State Aid Highway funding programs.

Roadway Functional Classification

Functional classification of a roadway defines the nature of services a particular roadway is intended to provide, as summarized in Table 3. The classifications are based on the anticipated volumes of traffic the roads carry, whether the roads provide access to local uses such as properties or they are intended to provide more regional access, speed limits, and area character. Figure 16 shows Framingham's roadway classification.

Table 3 Roadway Classification

Classification	Level of Mobility	Description	Speed Limit (mph)
Interstate	Greatest level of regional mobility (limited access roadway)	Primary connectors between cities, regions and bordering states.	45-65
Principal/ Major Arterial	Highest level of regional mobility for full access roadways	Connectors between cities, regions and bordering states. Support major shopping areas, high density residential developments, regional hospitals and other regional scale developments serving high volumes of traffic.	25-55
Minor Arterial	Lower level of regional mobility	Support intra-county level shopping centers, moderate residential development, and travel through many urban town centers.	25-55
Collector	Intra-regional level of mobility	Connectors between arterial and local network. Support schools, parks and smaller scale retail use.	25-55
Local	Lowest level of mobility	Supports adjacent land use serving local trip purposes.	15-40

Source: MassDOT website.

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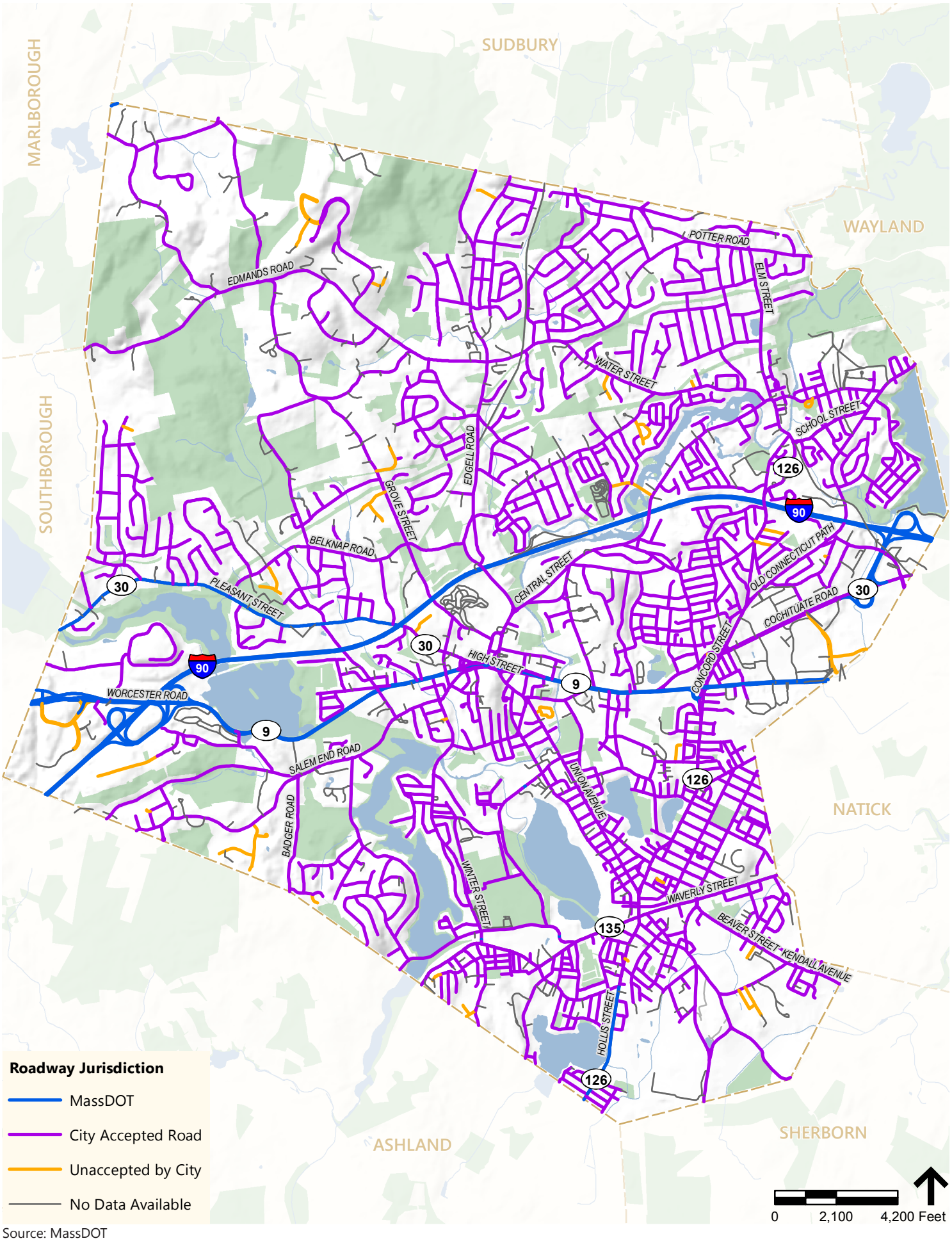
FIGURE 15: ROADWAY JURISDICTION



Source: MassDOT

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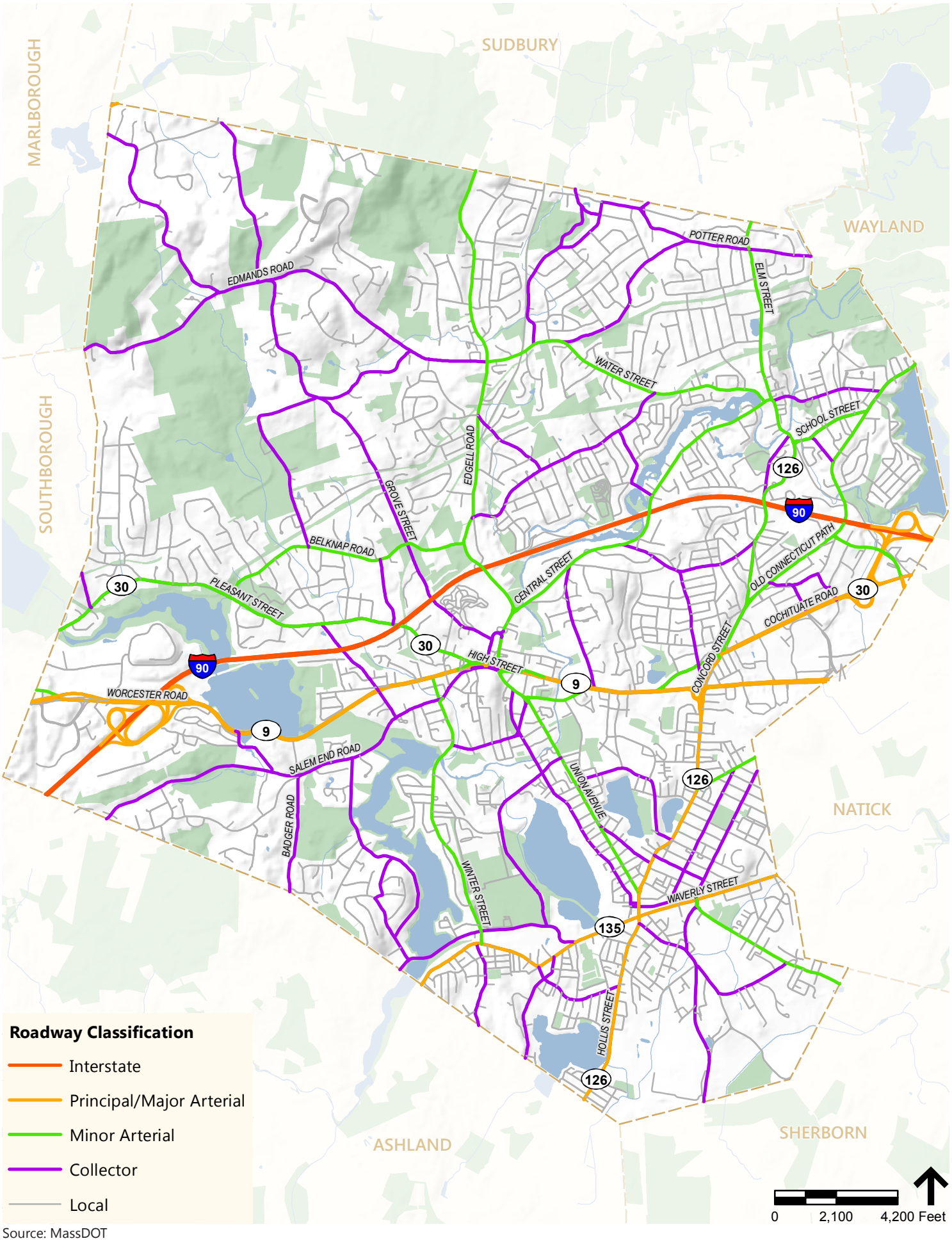
FIGURE 16: ROADWAY CLASSIFICATION



Source: MassDOT

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Study Area Key Corridors

The roadways selected as key corridors facilitate connectivity between Framingham and the regional transportation network. These corridors, which are the backbone of the roadway network and are major commuter roadways, tend to be the most congested as well. Table 4 summarizes the characteristics of the key corridors and Graphics 3 and 4 show the daily traffic volumes (detailed descriptions are provided in Appendix I).

The roadways tend to experience peak traffic volumes consistent with commuter periods. Roadways located near dense retail areas such as Downtown, Framingham Mall, and Shoppers World also experience midday traffic volume peaks.

Although many of the major roadways in Framingham experience congestion, opportunities to improve operations are sometimes limited, particularly in the dense commercial areas, due to right-of-way constraints and physical barriers. Also, improving operations for vehicles may negatively impact operations for other modes of travel.

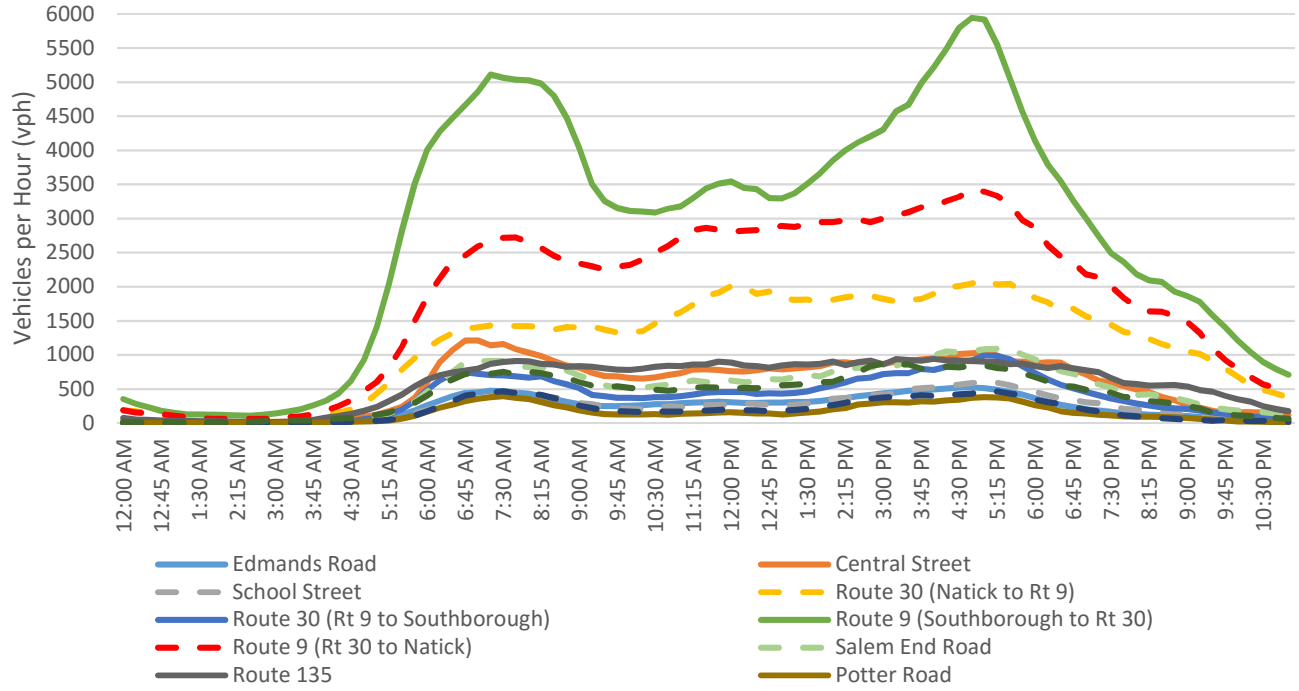
In general, the major east-west oriented roadways (I-90 and Route 9) tend to carry more regional (pass-through) traffic, with origins and destinations outside of Framingham, while the minor north-south roadways carry more local traffic, with origins and/or destinations within Framingham. Physical constraints such as other roadways, rail lines, and natural features impede the ability to easily develop stronger north-south connections.

Table 4 Study Area Corridors

Corridor	Posted Speed Limit (mph)	Functional Class	Jurisdiction	Weekday ADT [1] (vpd [2])	Weekday Truck ADT (vpd)
East/West					
Edmands Road	20-30	Urban Collector	Local	5,400	400
Water Street	25-30	Urban Minor Arterial	Local	9,900	350
Potter Road	25-30	Urban Collector	Local	3,500	150
Belknap Road	25	Urban Minor Arterial	Local	4,400	100
Central Street	30-35	Urban Minor Arterial	Local	13,100	350
Route 30 (Pleasant Street) *from Southborough town line to Route 9/Edgell Road*	30-40	Urban Minor Arterial	Local/MassDOT	9,100	350
School Street	20	Urban Minor Arterial	Local	5,500	200
Route 30 (Cochituate Road) *from Route 9 to Natick town line*	30-40	Urban Principal Arterial/Urban Minor Arterial	Local	27,500	700
Route 9 *from Southborough town line to Route 30*	35-45	Urban Principal Arterial	MassDOT	66,000	n/a
Route 9 *from Route 30 to Natick town line*	30-40	Urban Principal Arterial	MassDOT	43,400	1,500
Salem End Road	25-30	Urban Collector	Local	11,800	700
Route 135	25-30	Urban Principal Arterial	Local	13,800	800
Beaver Street	35	Urban Minor Arterial	Local	7,900	300
North/South					
Badger Road	25	Urban Collector	Local	8,600	300
Winter Street	25	Urban Minor Arterial	Local	11,400	200
Grove Street	25-35	Urban Collector	Local	4,500	150
Edgell Road	25-35	Urban Minor Arterial	Local	15,600	550
Union Avenue	30-35	Urban Minor Arterial	Local	15,500	650
Route 126 *from Ashland town line to Old Connecticut Path*	30-35	Urban Principal Arterial	Local/MassDOT	24,200	1,100
Route 126/Concord Street *from Old Connecticut Path to Central Street*	30-35	Urban Minor Arterial	Local	15,900	400
Old Connecticut Path	30-35	Urban Minor Arterial	Local	8,900	250
Elm Street	30	Urban Minor Arterial	Local	8,900	300

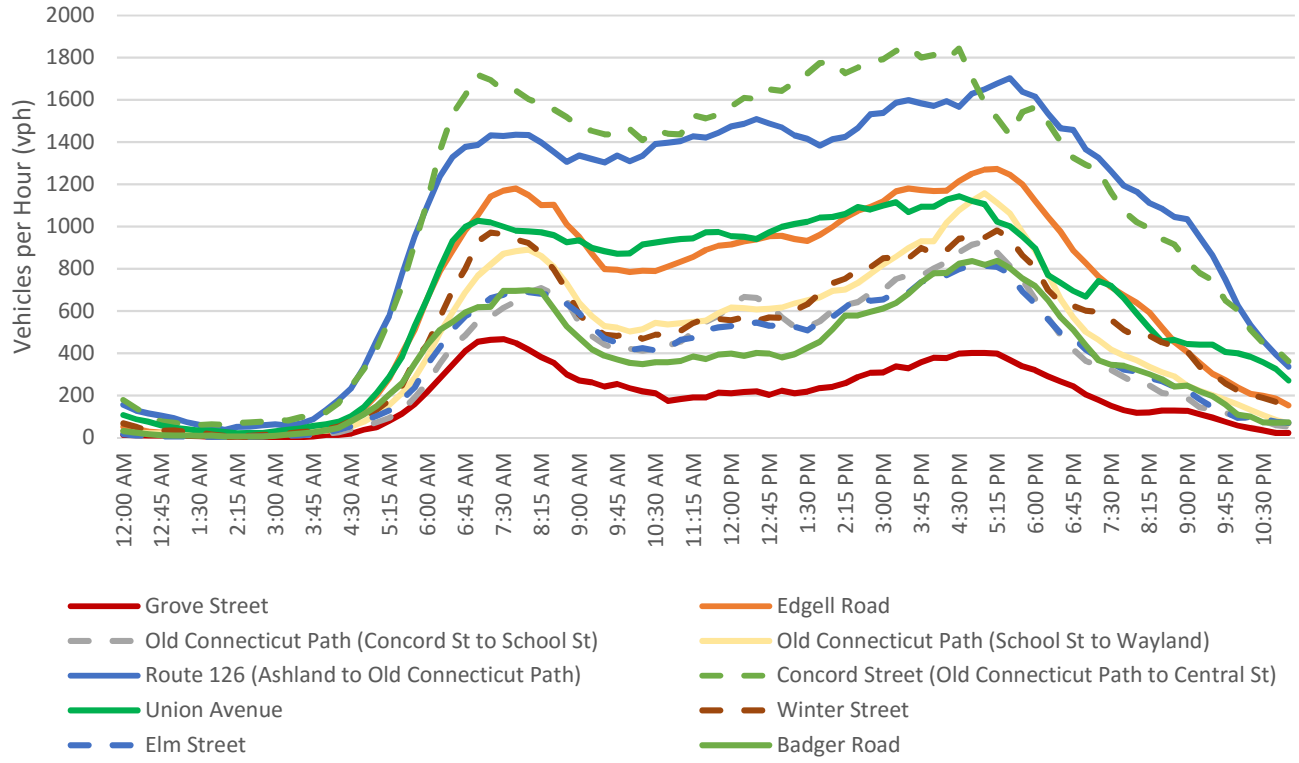
1 average daily traffic
2 vehicles per day

Graphic 3 Hourly Traffic Volumes – East-West Oriented Roadways



Note: Hourly data not available for Beaver Street.

Graphic 4 Hourly Traffic Volumes – North-South Oriented Roadways



Traffic Operations

Roadway traffic operations are typically assessed using level of service (LOS). LOS is a qualitative measure of a number of factors including roadway geometrics, speed, travel delay and freedom to maneuver. Table 5 defines the characteristics of each LOS, A through F. Within urban and suburban areas, LOS A through D is considered acceptable operations. For signalized intersections, the analysis considers the operation of all traffic entering the intersection and the LOS designation is for overall conditions. For unsignalized intersections, the LOS designation is for the critical movement exiting the side street — typically the left turns.

Table 5 Vehicle LOS Defined

A	Free flow, minimal delays.
B	Stable traffic flow, low levels of delay and queuing.
C	Stable traffic flow, movements affected by interactions with other motorists, acceptable levels of delay and queuing.
D	Movements more restricted, more extensive levels of delay and queuing. Historically, desirable LOS objective in urban areas.
E	Near-capacity, long delays and queuing. Common LOS standard in larger urban areas, where some roadway congestion is inevitable.
F	Over-capacity, very long delays and queuing.

Figures 17 and 18 illustrate the study area intersections existing LOS. Detailed capacity analysis tables and worksheets are provided in Appendix III.

Automobile Network Deficiencies

The dependency of Framingham residents and workers on automobiles places high demands on the automobile infrastructure. Many of the key corridors and study area intersections experience congestion and poor operations. The following summarize the areas with significant automobile network deficiencies. It should be noted that some level of congestion is inevitable in urban areas such as Framingham due to existing constraints and competing needs among transportation modes.

- Poor operations along Route 9 and in Framingham Centre during the commuter peak periods.
- Poor operations in Framingham Mall and Shoppers World areas during the weekday evening peak period.
- Limited north-south connections impeded by physical barriers (roadways, rail lines, and natural features).
- High vehicle speeds in Northwest Framingham creating unsafe conditions for other road users.
- Atypical intersection geometries contribute to poor operations.
- Opportunities for improvement in operations are limited by constraints and potential negative impacts to other modes.

FIGURE 17: LEVEL OF SERVICE - WEEKDAY MORNING PEAK HOUR

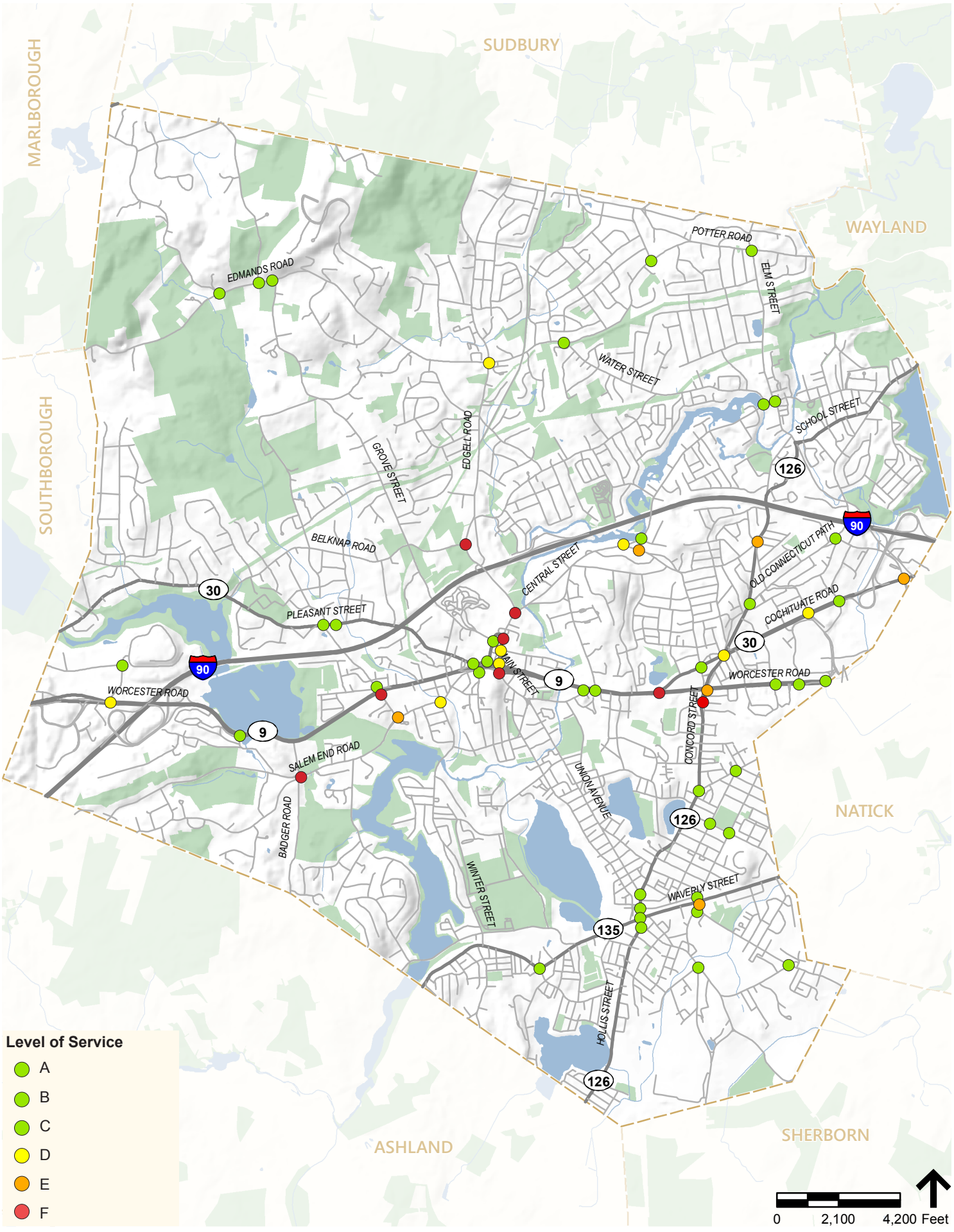


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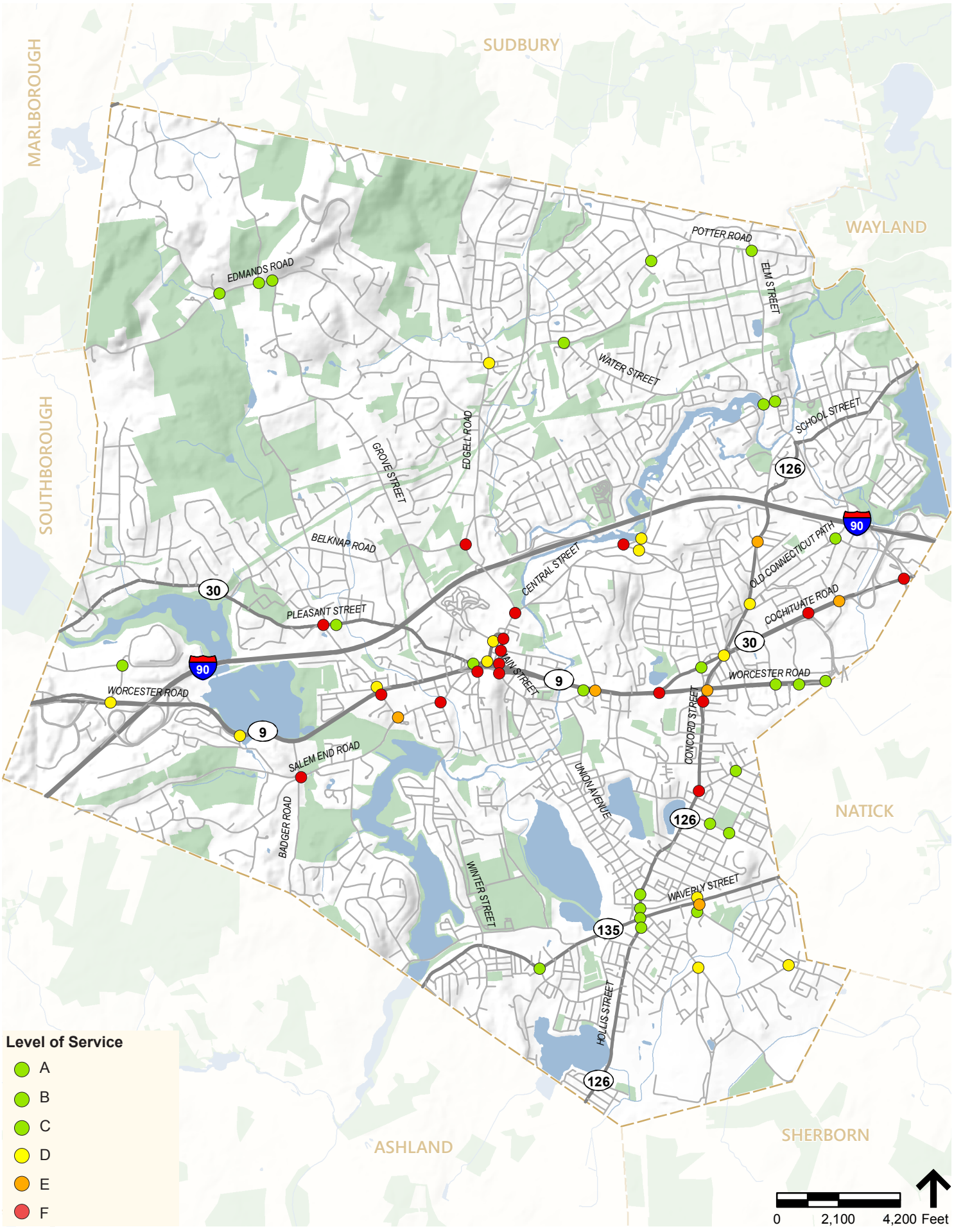
FIGURE 18: LEVEL OF SERVICE - WEEKDAY EVENING PEAK HOUR



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5

Pedestrian Network

Framingham has more than 200 miles of sidewalk, with most located in denser urban areas such as Downtown. The different availability of pedestrian amenities and proximity of desired destinations throughout Framingham's neighborhoods predictably result in varying walking mode share levels.

Walk Score is a measure of the walkability of a location based on distance to amenities such as grocery stores, schools, parks, restaurants and retail. Table 6 describes ranges and associated characteristics of walk scores.

Framingham's Walk Score is 41[15], indicating it is considered a car dependent city. Citywide, Framingham's Walk Score partially reflects the fact that some neighborhoods lack sidewalk connectivity as well as density and proximity to amenities (for instance Northwest Framingham). Areas closer to the village centers would have higher walk scores. For instance, Downtown Framingham has a Walk Score of 89[12].

Table 6 Walk Score

Walk Score 90-100	**Walker's Paradise** Daily errands do not require a car.
Walk Score 70-89	**Very Walkable** Most errands can be accomplished on foot.
Walk Score 50-69	**Somewhat Walkable** Some errands can be accomplished on foot.
Walk Score 25-49	**Car-Dependent** Most errands require a car.
Walk Score 0-24	**Car-Dependent** Almost all errands require a car.

Source: Walk Score website, accessed March 2017.

Pedestrian Volumes

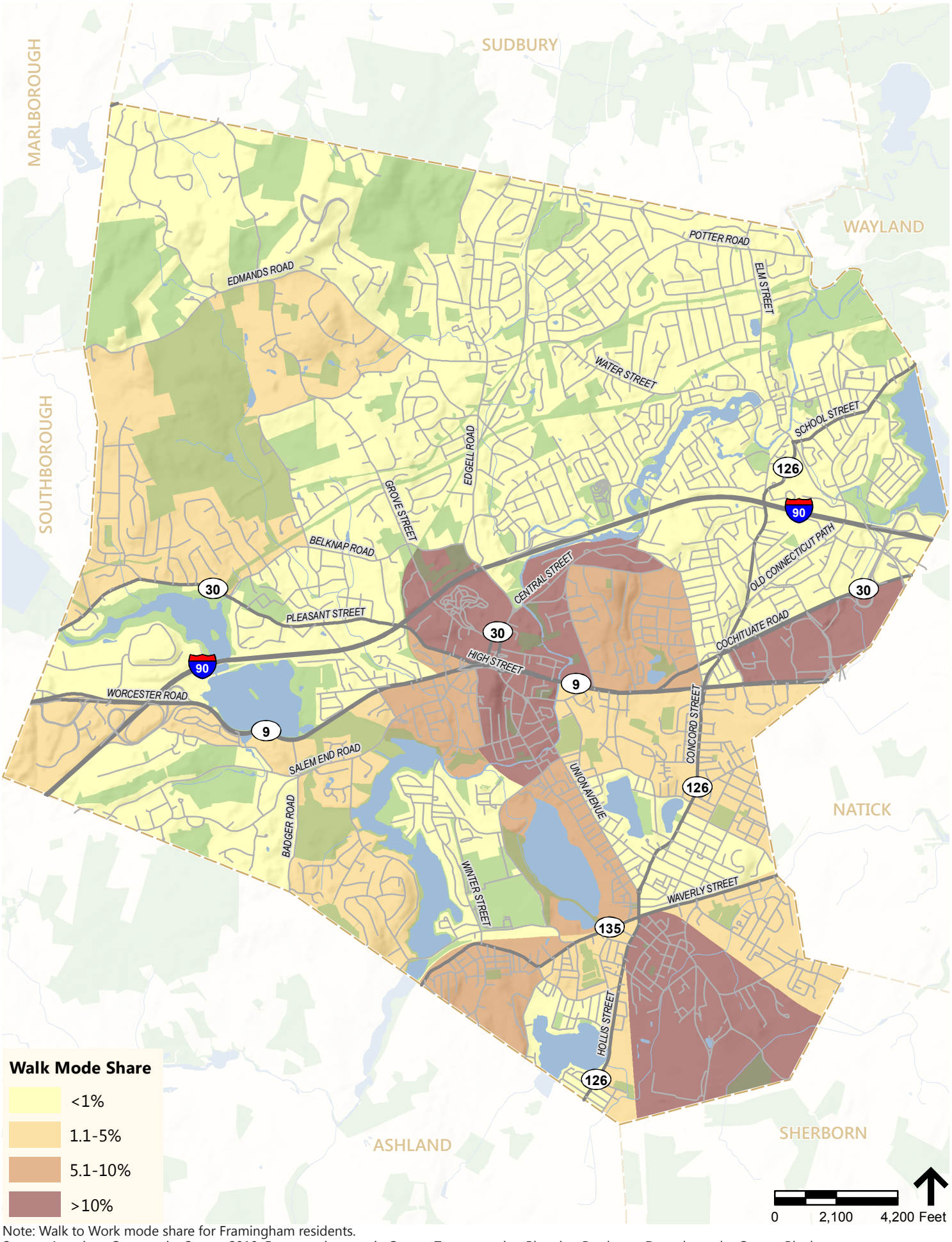
The varying characteristics of Framingham neighborhoods and associated pedestrian infrastructure result in different walking trends throughout the City. A review of volumes indicate that the majority of pedestrian activity occurs in Downtown, Framingham Centre, and Shoppers World, while few pedestrians were observed in Northwest Framingham, Salem End, and Technology Park. This is consistent with the share of Framingham's residents walking to work[16] (see Figure 19).

Figures 20 and 21 summarize pedestrian volumes for the morning and evening peak hours, respectively.

[15] Walk Score website, accessed March 2017.

[16] American Community Survey 2010, 5-year estimates via Census Transportation Planning Products.

FIGURE 19: WALK MODE SHARE



Note: Walk to Work mode share for Framingham residents.
Source: American Community Survey 2010, 5-year estimates via Census Transportation Planning Products. Data shown by Census Block.

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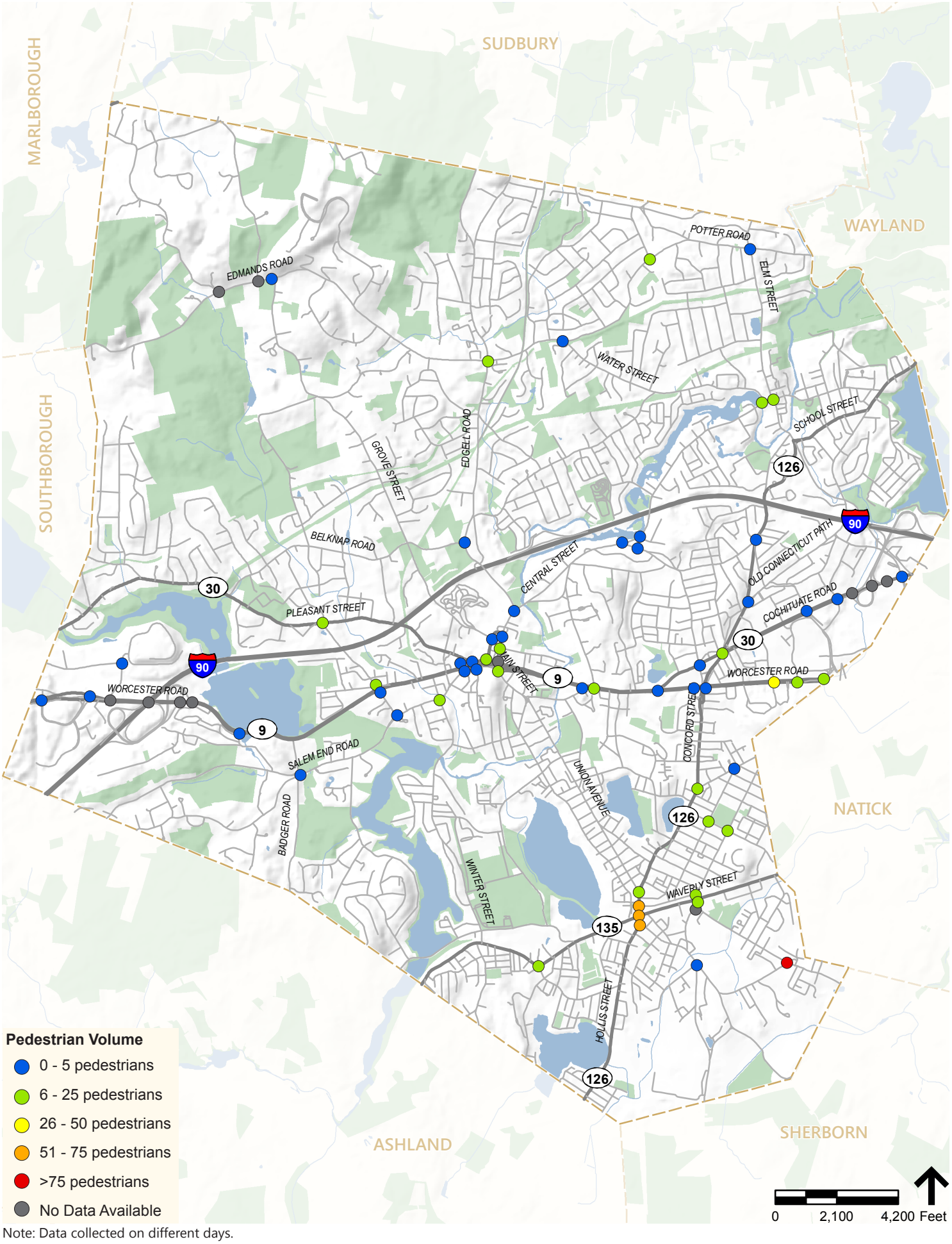
FIGURE 20: PEDESTRIAN VOLUMES - WEEKDAY MORNING PEAK HOUR



Note: Data collected on different days.

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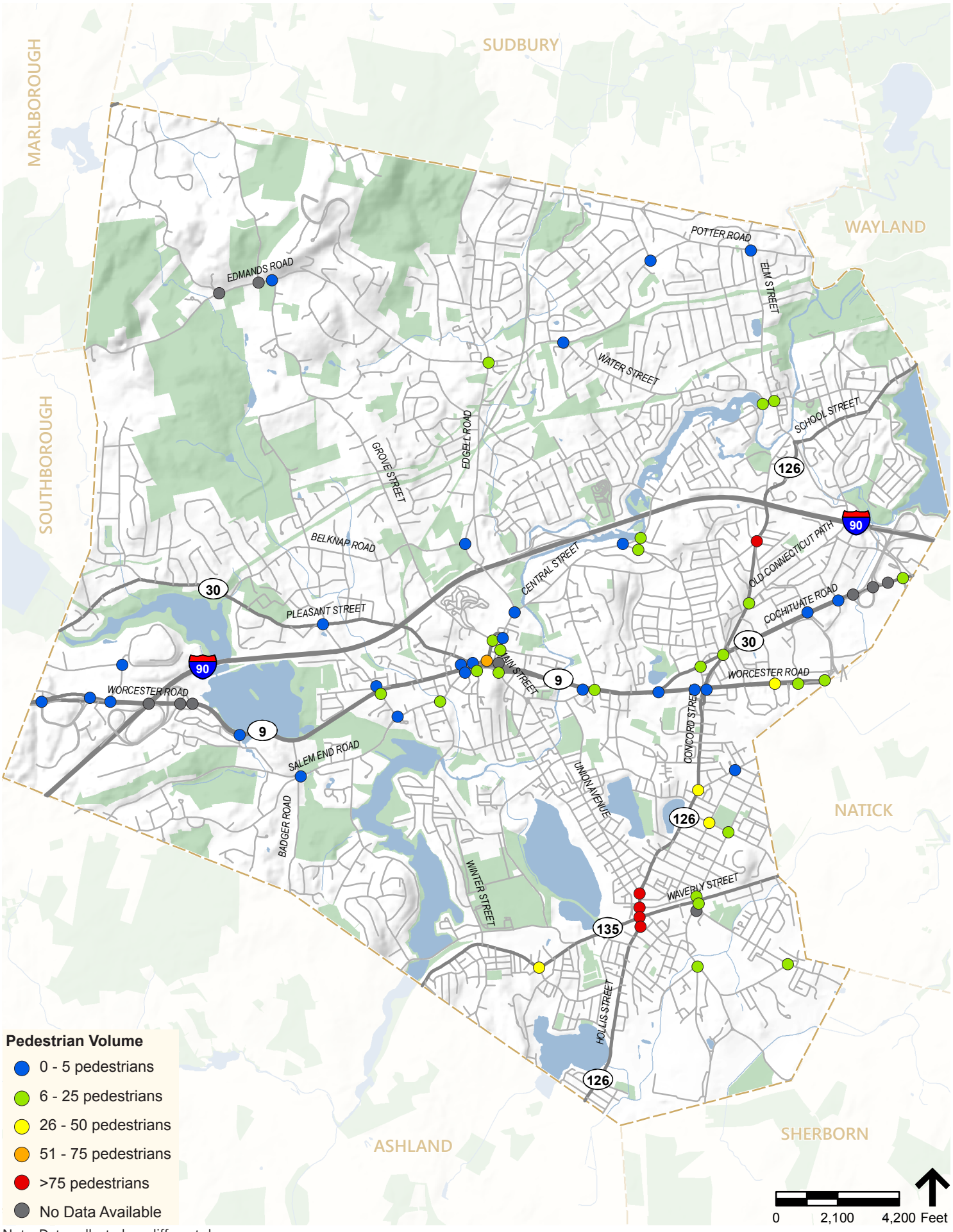
FIGURE 21: PEDESTRIAN VOLUMES - WEEKDAY EVENING PEAK HOUR



Note: Data collected on different days.

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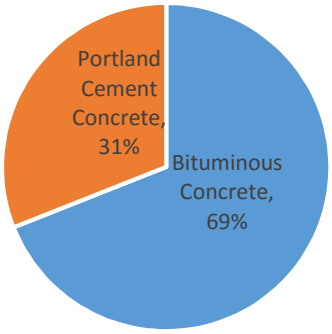
Pedestrian Infrastructure

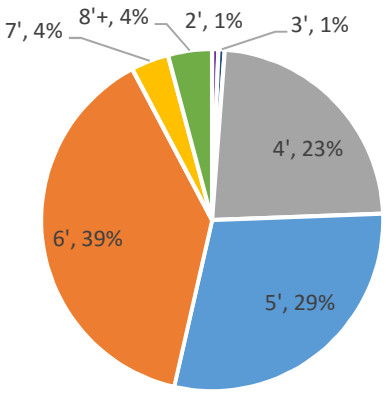
Sidewalks are available in much of the City, with more in denser urban areas such as Downtown and lacking in the more rural areas such as Northwest Framingham. Many of the major roadways within Framingham have sidewalks. However, due to the high traffic volumes and speeds, numerous curb-cuts, and wide driveways along these roadways, these sidewalks may not be perceived as safe and/or attractive to pedestrians. Figure 22 illustrates Framingham's sidewalk coverage along with the location of schools and other civic buildings.

The majority of sidewalks in Framingham are built out of bituminous concrete with almost all of the remaining being Portland Cement Concrete[17]. Other sidewalk materials include brick and gravel, but those consist of less than 0.5% of all sidewalks. Graphics 5 and 6 show the type and width of the City's sidewalks, respectively, and Figure 23 shows the width of the City's sidewalks by location; over 75% of all sidewalks are 5 feet or wider. Out of these sidewalks, approximately 75% have no obstructions[17].

Graphic 5 Sidewalk Type



Graphic 6 Sidewalk Width



Out of the almost 2,330 pedestrian ramps in Framingham, 109 are in poor condition. While in fair or better conditions, 843 ramps are not currently compliant with ADA requirements. Additionally, there are approximately 752 ramps "missing" — having an existing crosswalk leading to a vertical curb surface[17]. Framingham has a GIS database of all the sidewalks and pedestrian ramps which is kept up-to-date with information on location, condition, and when maintenance was performed.

[17] *Town Sidewalk Accessibility Study*, VHB Inc., March 2016.

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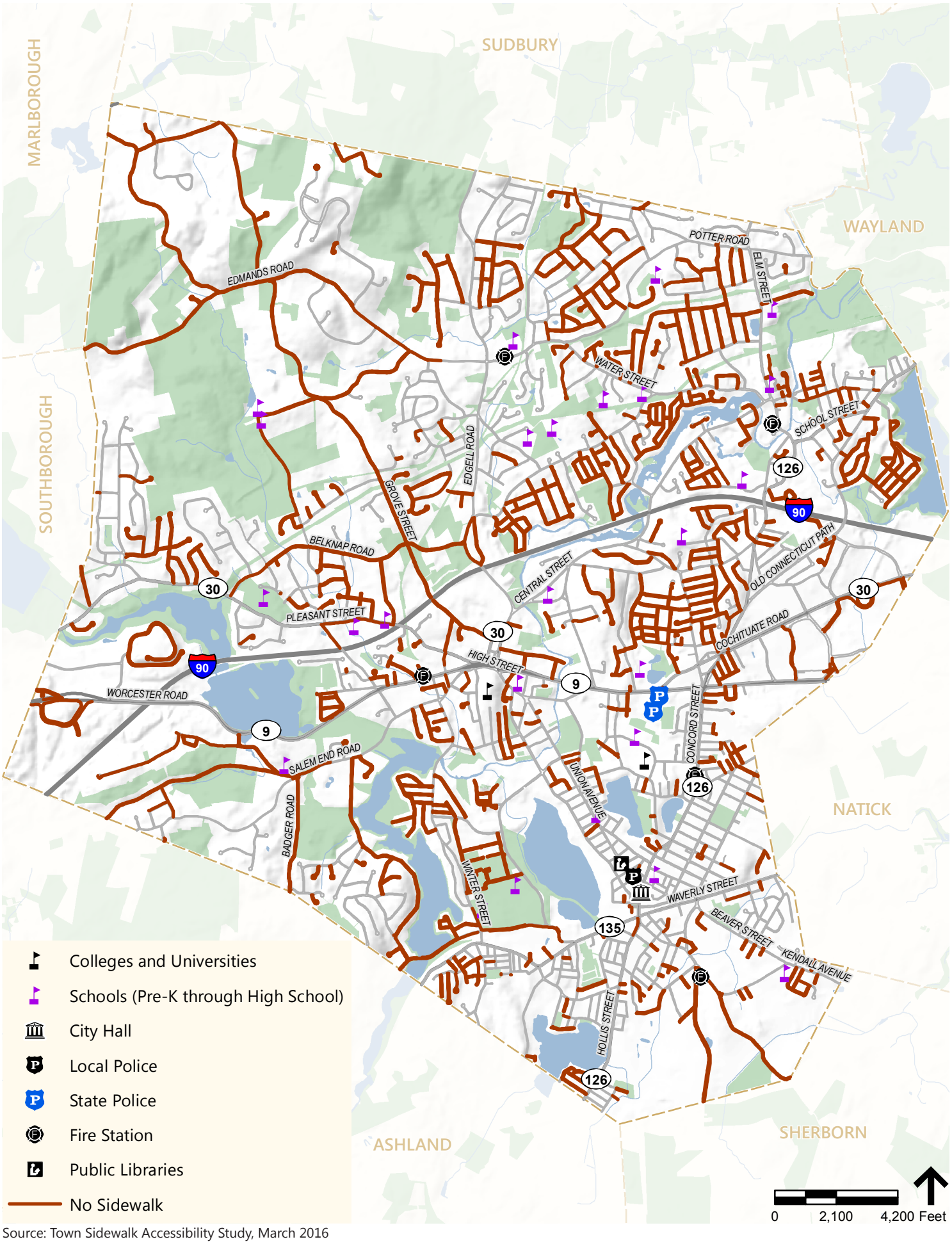
FIGURE 22: SIDEWALK COVERAGE AND PUBLIC LOCATIONS



Source: Town Sidewalk Accessibility Study, March 2016

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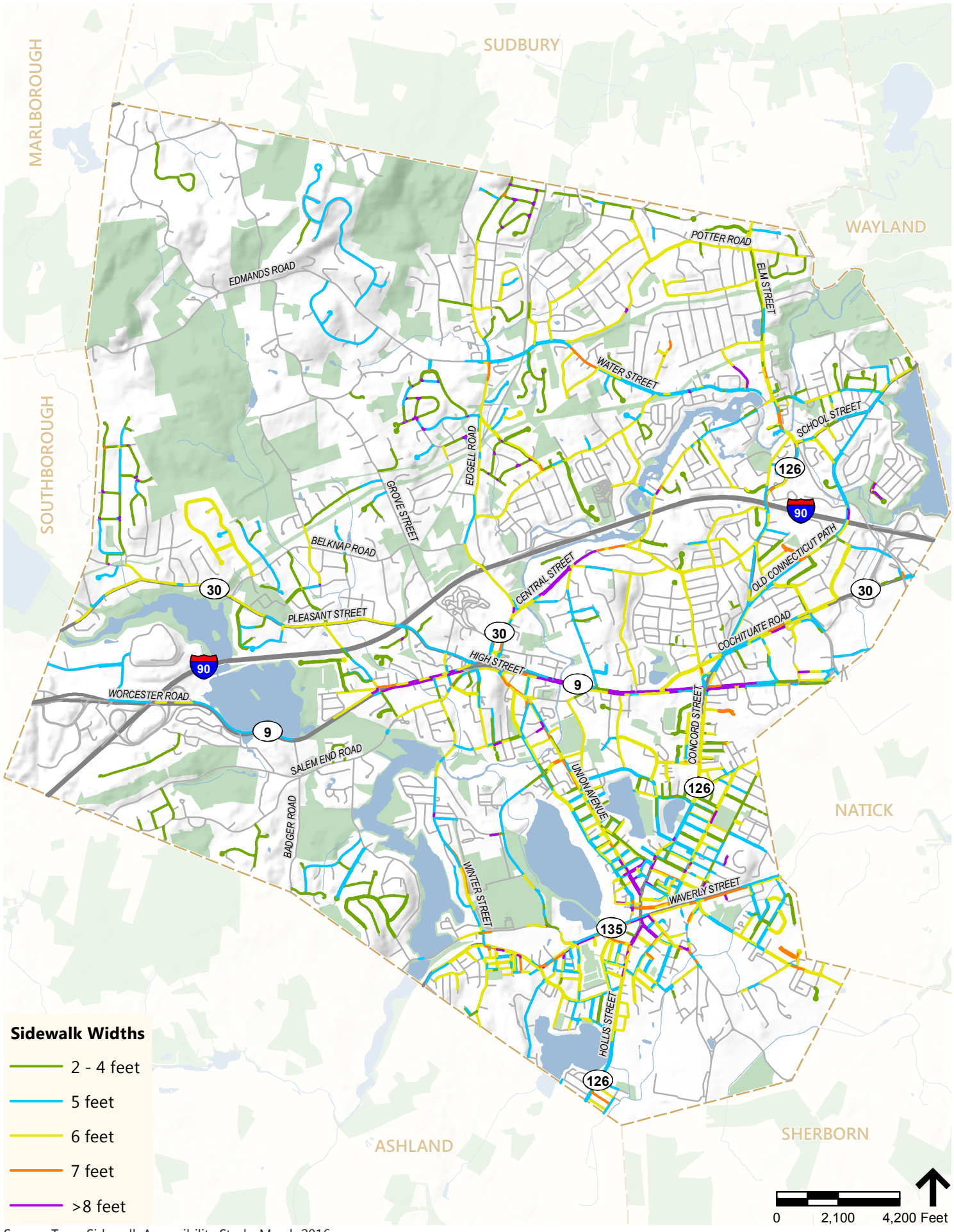
FIGURE 23: SIDEWALK WIDTH



Source: Town Sidewalk Accessibility Study, March 2016

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To track the overall conditions of the City's sidewalk network, every sidewalk was assigned a Sidewalk Condition Index (SCI), which is based on the sidewalk's condition rating. The SCI ratings were assigned based on a sidewalk inventory conducted in 2016[18]. The City's average SCI weighted by length is 78 — between fair and good. Just under half of the sidewalks in Framingham are considered to be in excellent or good conditions[18] (see Figure 24). Table 7 summarizes the condition of Framingham's sidewalks.

Table 7 Sidewalk Condition

Condition	Description	Sidewalk Condition Index Rating	Percentage of Sidewalks
Excellent	like new	100	15%
Good	light wear	85	34%
Fair	considerable wear, cracking or distortion	70	42%
Poor	Wear, cracking or distortion significantly impacts serviceability	55	9%
Source: Town Sidewalk Accessibility Study, VHB Inc., March 2016.			

[18] *Town Sidewalk Accessibility Study*, VHB Inc., March 2016.

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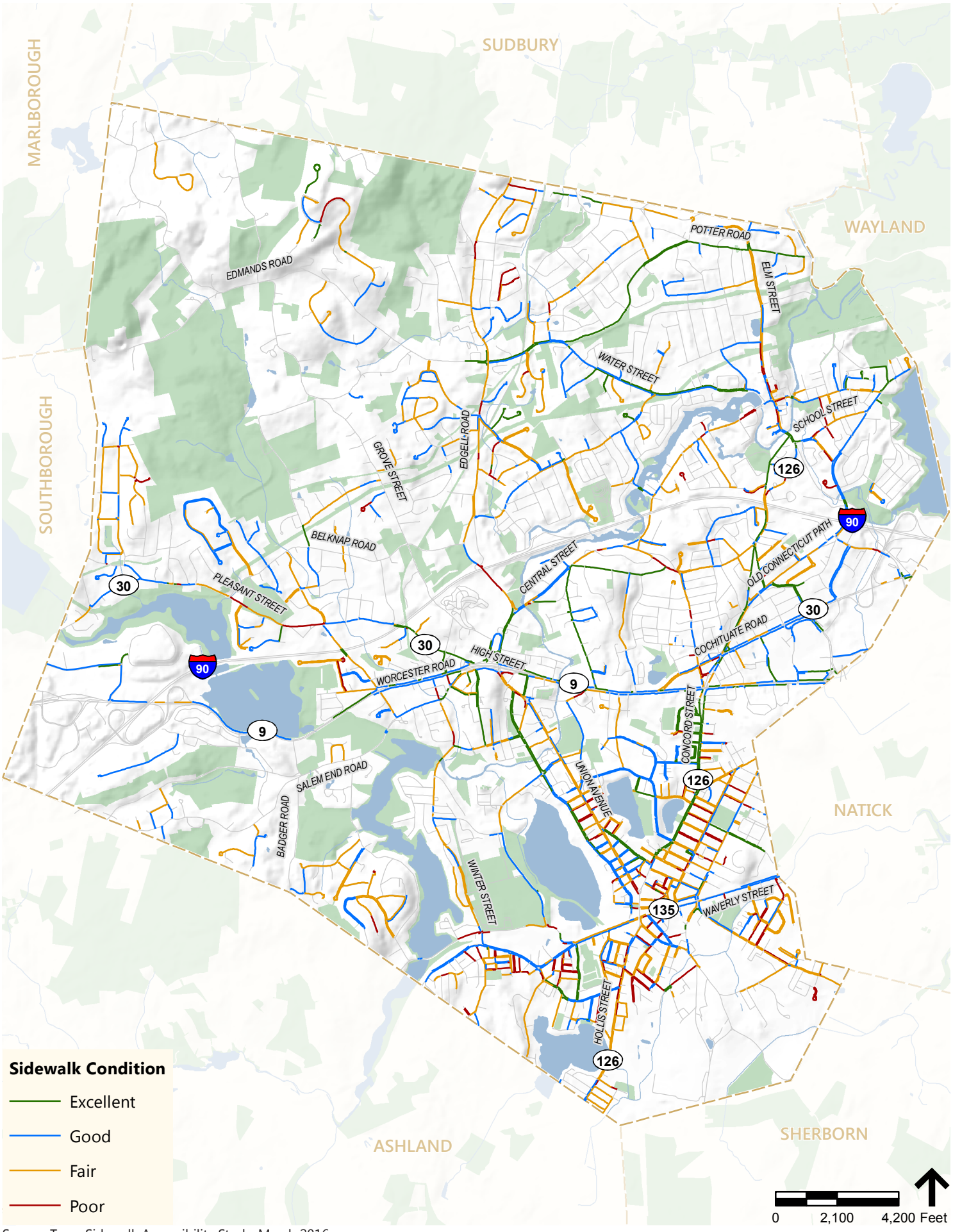
FIGURE 24: SIDEWALK CONDITIONS



Source: Town Sidewalk Accessibility Study, March 2016

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Pedestrian Network Deficiencies

Although Framingham has an extensive sidewalk network with adequate amenities at intersections with high pedestrian activity, accessibility for all users and connections in some areas of Framingham are lacking. For instance:

- A quarter of the sidewalks over 5 feet wide in Framingham have one or multiple obstructions.
- A quarter of the sidewalks in Framingham are under 5 feet wide.
- Approximately half the pedestrian ramps in Framingham are in poor condition and/or are not ADA compliant. In addition, many locations are missing pedestrian ramps altogether.
- Limited sidewalk connectivity in Northwest Framingham and Salem End.
- Limited pedestrian accommodations at signalized intersections in Salem End.
- Auto-dominant characteristics of some roadways lead to the perception that pedestrian infrastructure is unfriendly or unsafe.
- The Downtown experiences a high number of pedestrians, and also a high number of crashes involving pedestrians. It should be noted the Route 126 (Concord Street) within the Downtown was recently reconstructed with improved pedestrian accommodations and the available crash data are not reflective of these improvements.

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6

Bicycle Network

Framingham currently has few bicycle facilities. However, a number of roadways are being designed and constructed with wide shoulders to better accommodate bicycles.

Bicycle Volumes

Biking makes up less than 1% of the travel mode for commuters in Framingham. In some areas, such as Framingham Centre, it is closer to 2-3%[19]. Figure 25 shows the bike-to-work mode share for the City.

A review of traffic data indicate that few cyclists are present during peak commuter hours in most areas of Framingham, potentially due to safety concerns related to the lack of bicycle facilities. It should be noted that no bicycle volume data are available for non-commuter peak hours or weekends. The traffic data showed most bicycle activity in Downtown and few bicyclists in Northwest Framingham, Shoppers World, and Salem End. Figures 26 and 27 summarize bicycle volumes for the morning and evening peak hours, respectively. Based on the Metropolitan Area Planning Council's (MAPC) Local Access Score for Bicycles [20], desire lines are present in the Downtown and Shoppers World areas.

[19] American Community Survey 2010, 5-year estimates via Census Transportation Planning Products.

[20] MAPC Local Access Website Tool, accessed October 2017.

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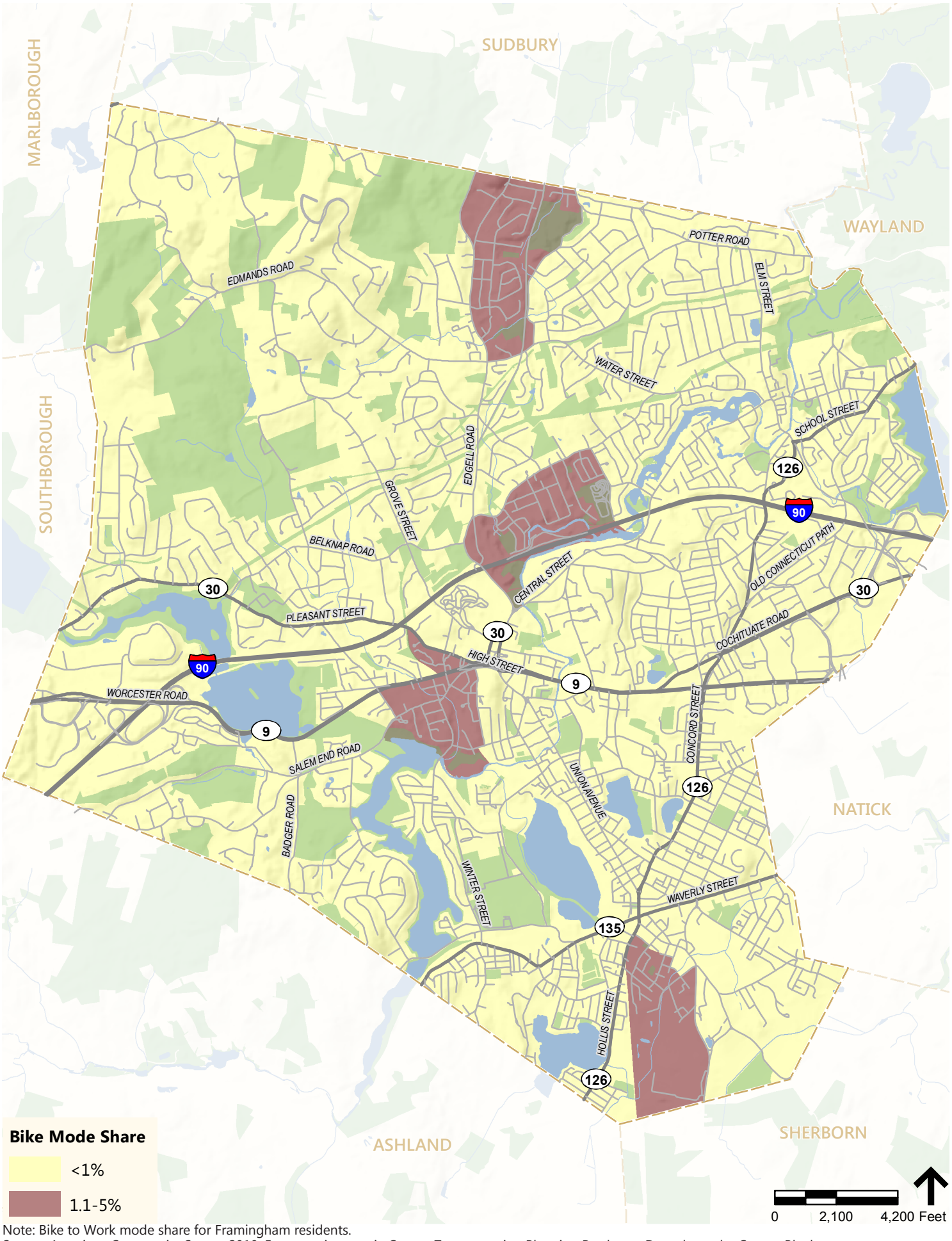
FIGURE 25: BIKE MODE SHARE



Note: Bike to Work mode share for Framingham residents.
Source: American Community Survey 2010, 5-year estimates via Census Transportation Planning Products. Data shown by Census Block.

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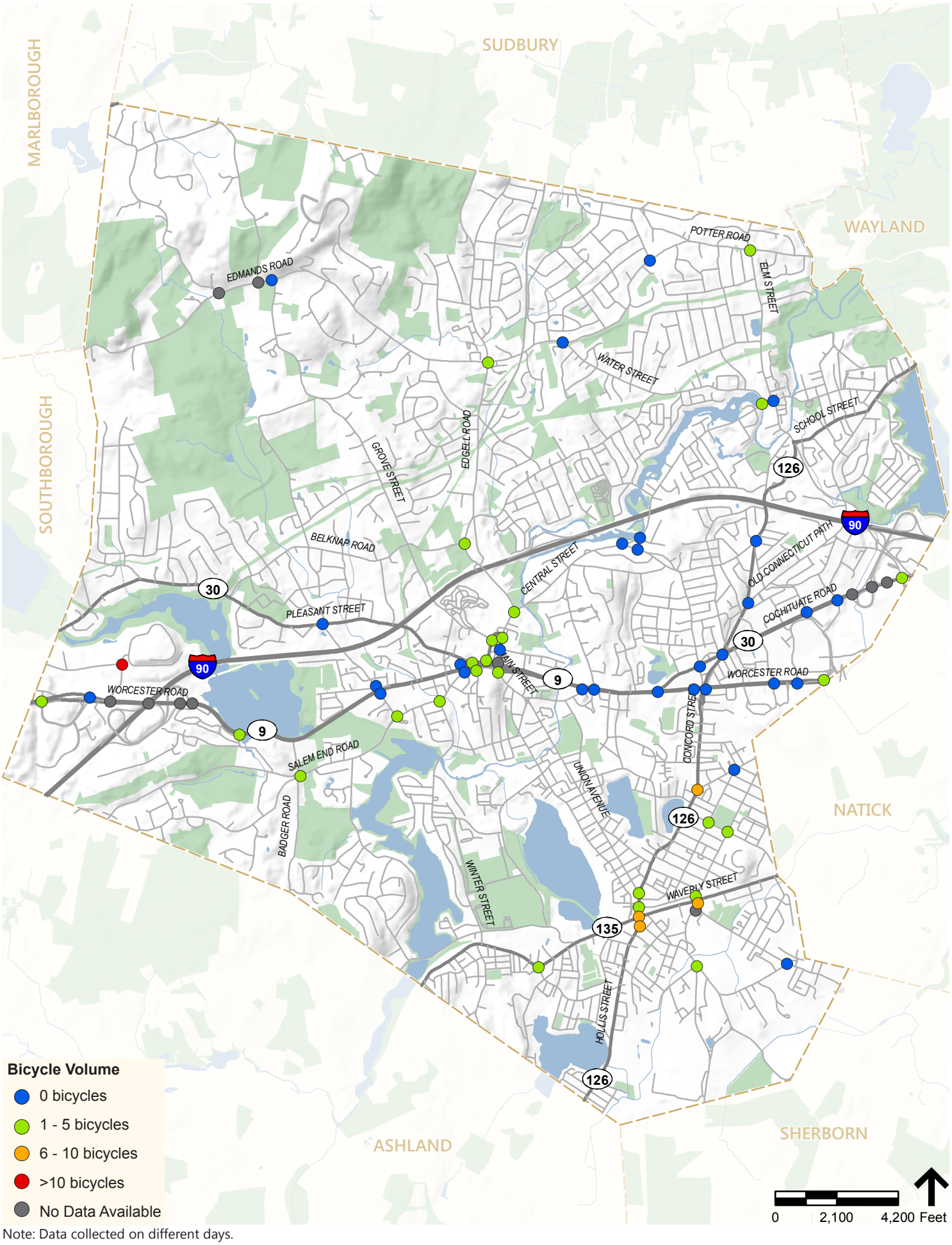
FIGURE 26: BICYCLE VOLUMES - WEEKDAY MORNING PEAK HOUR



Note: Data collected on different days.

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FIGURE 27: BICYCLE VOLUMES - WEEKDAY EVENING PEAK HOUR

Note: Data collected on different days.

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Bicycle Infrastructure

Water Street Bikes Lanes *begin at Hemenway Road and extend east to approximately 400 feet before the Water Street at Central Street intersection*

Presently, marked bike lanes in Framingham exist along Water Street and Waverly Street. Anecdotal evidence indicates that the recently constructed bicycle lanes have been well-received with an increasing number of users. Route 126 (Concord Street) in Downtown has bicycle accommodations, in the form of shared lane markings ("sharrows") and bicycle detection at signals. Consistent with the City's Complete Streets Policy[21], roadways which are currently being designed and constructed include wide shoulders (typically 4 feet), to better accommodate bicycles. As part of MassDOT's Complete Streets Funding Program, the Dudley-Mt. Wayte Corridor Bicycle and Pedestrian Improvement Project, Phase 2, a multi-use path, received funding in 2017 and will be constructed in 2018. Phase 1 of the project was constructed in 2016.

Cochituate Rail Trail

Additionally, signalized locations, both existing and new, are being designed to provide bicycle accommodations and new commercial development projects are required to provide bicycle parking.

Several off-road trails are available and primarily used for recreational biking; including the Bay Circuit Trail, Carol Getchell Trail, Cochituate Rail Trail (pictured above), Sudbury Aqueduct, Weston Aqueduct, and Callahan State Park.

[21] *Policy on Complete Streets*, Town of Framingham Board of Selectmen, January 6, 2015.

Many of the major roadways within Framingham have informal bicycle accommodations in the form of shoulders, however, due to the high traffic volumes and speeds, numerous curb-cuts, and wide driveways, bicycling along these roadways may not be perceived as safe.

Bicycle Network Deficiencies

Framingham's limited bicycle network is reflected by the limited bicycle volumes within the City. The following summarizes the bicycle network shortages:

- Lack of bicycle facilities, particularly along/adjacent to major corridors.
- Lack of accommodations (e.g., bicycle signals, bike boxes, signage) at intersections.
- Limited connectivity between residential and work areas, as well as to public transportation facilities.
- The Downtown experiences a high number of bicyclists, but also a high number of crashes involving bicyclists.
- Based on the Bicycle & Pedestrian Plan[22], the following roadways were identified as candidates for bicycle accommodations within the five-year plan; Speen Street, Fountain Street, Route 126 (Concord Street) to connect segments which already have accommodations, Bishop Street, Western Avenue, Old Connecticut Path, Central Street, and Pleasant Street.
- No detailed study on collector roadways and trails were done as part of the Bicycle & Pedestrian Plan[22], which focuses on arterials.

[22] *Framingham Bicycle & Pedestrian Plan*, Division of Community & Economic Development, 2017.

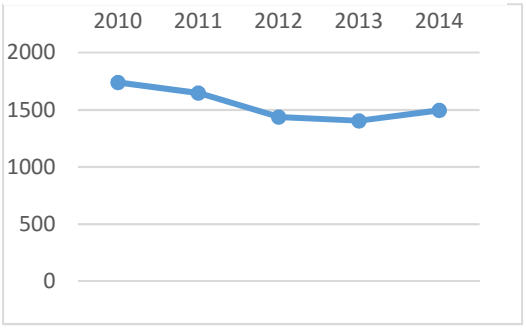
7

Safety

Based on MassDOT crash data, there were 7,725 crashes reported in Framingham over a five-year period. The trend in Framingham since 2010 has been overall a general reduction in crashes, although there was an increase in 2014 crashes, including those involving bicycles and pedestrians. This increase in crashes is consistent with nationwide and statewide trends.

The most recent five years of crash data[23] from MassDOT were reviewed. Out of the 7,725 crashes reported in Framingham, 18 resulted in fatalities, while 206 involved pedestrians (139) or bicycles (67). Graphic 7 shows the number of crashes per year for the years 2010 through 2014. Figure 28 illustrates the location of these crashes.

Graphic 7 Crashes per Year



Source: MassDOT crash data, accessed June 2017.

[23] January 1, 2010 through December 31, 2014

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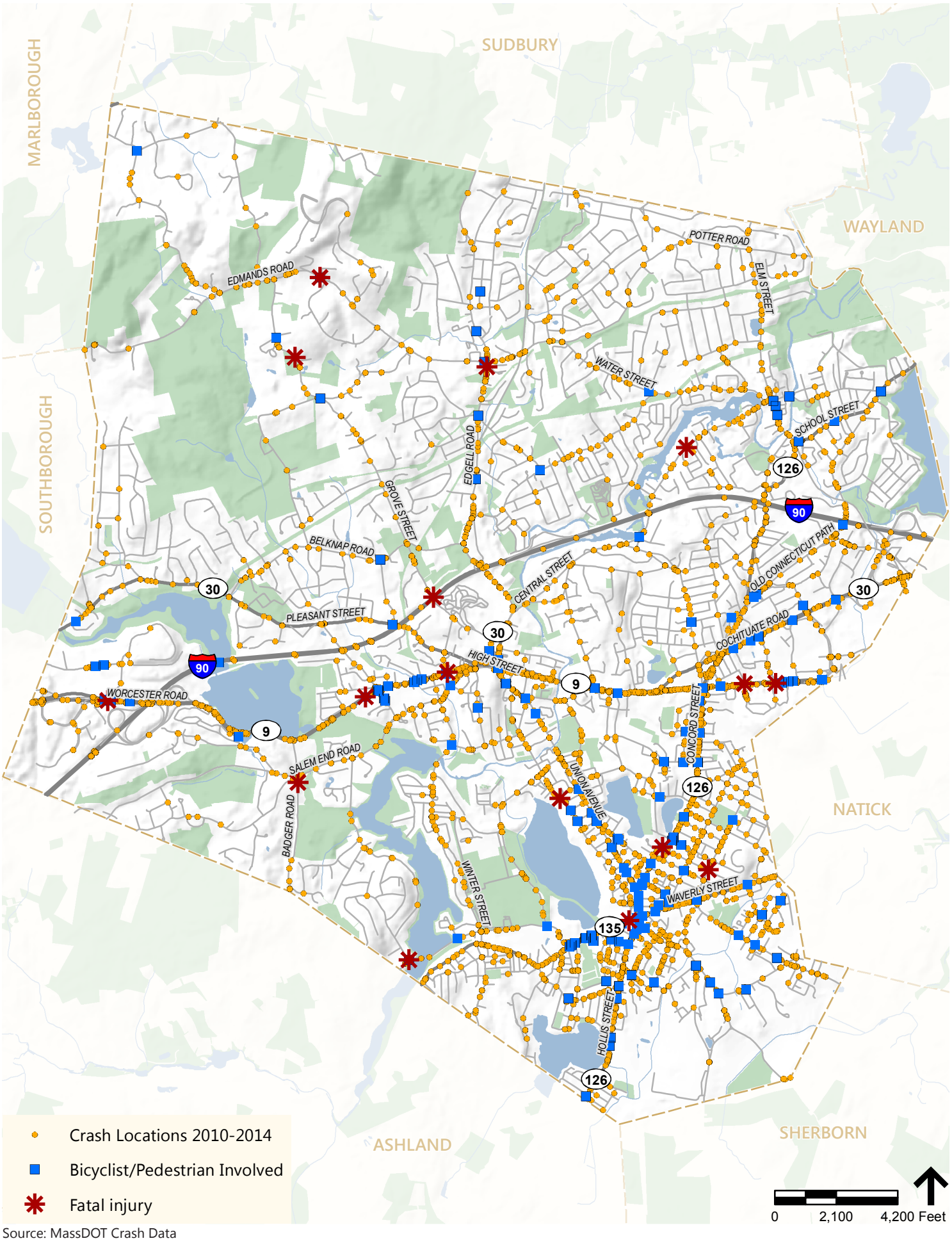
FIGURE 28: CRASHES



Source: MassDOT Crash Data

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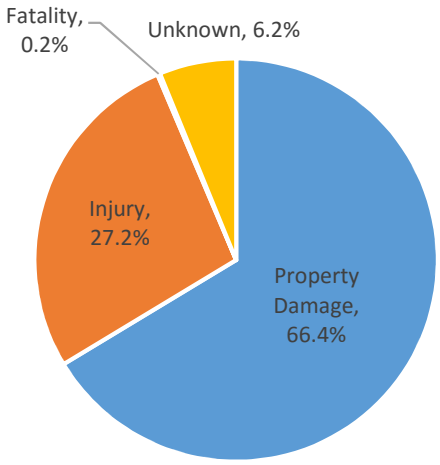
Figure 29 shows the locations which experienced a high concentration of crashes ("hot-spots"). As can be seen, the higher volume roadways, including Route 9, Route 30, Route 126 and Route 135, experienced the most crashes. Tech Park/9/90 Corporate Center, Downtown, Nobscot, Saxonville, and the Shoppers World neighborhoods also experienced high crash levels.

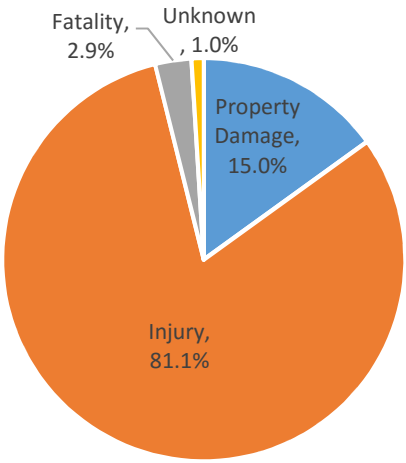
While crashes involving bicycles account for less than 1% of all crashes and those involving pedestrians for less than 2%, the much greater likelihood of injury to these users makes eliminating these crashes, consistent with Vision Zero[24], a high priority. Graphics 8 and 9 show the crash severity for all crashes and bicycle and pedestrian crashes, respectively.

Graphic 8 Crash Severity – All Crashes



Source: MassDOT crash data, accessed June 2017.

Graphic 9 Crash Severity – Bicycle and Pedestrian



Source: MassDOT crash data, accessed June 2017.

Although less than 30% of all crashes resulted in injury and 0.2% resulted in a fatality, 80% of crashes involving pedestrian and bicycles resulted in injury and almost 3% in a fatality. Figure 30 illustrates where pedestrian and bicycle crashes were reported in Framingham.

[24] "Vision Zero is a strategy to eliminate all traffic fatalities and severe injuries, while increasing safe, healthy, equitable mobility for all." Source: www.visionzeronetwork.org.

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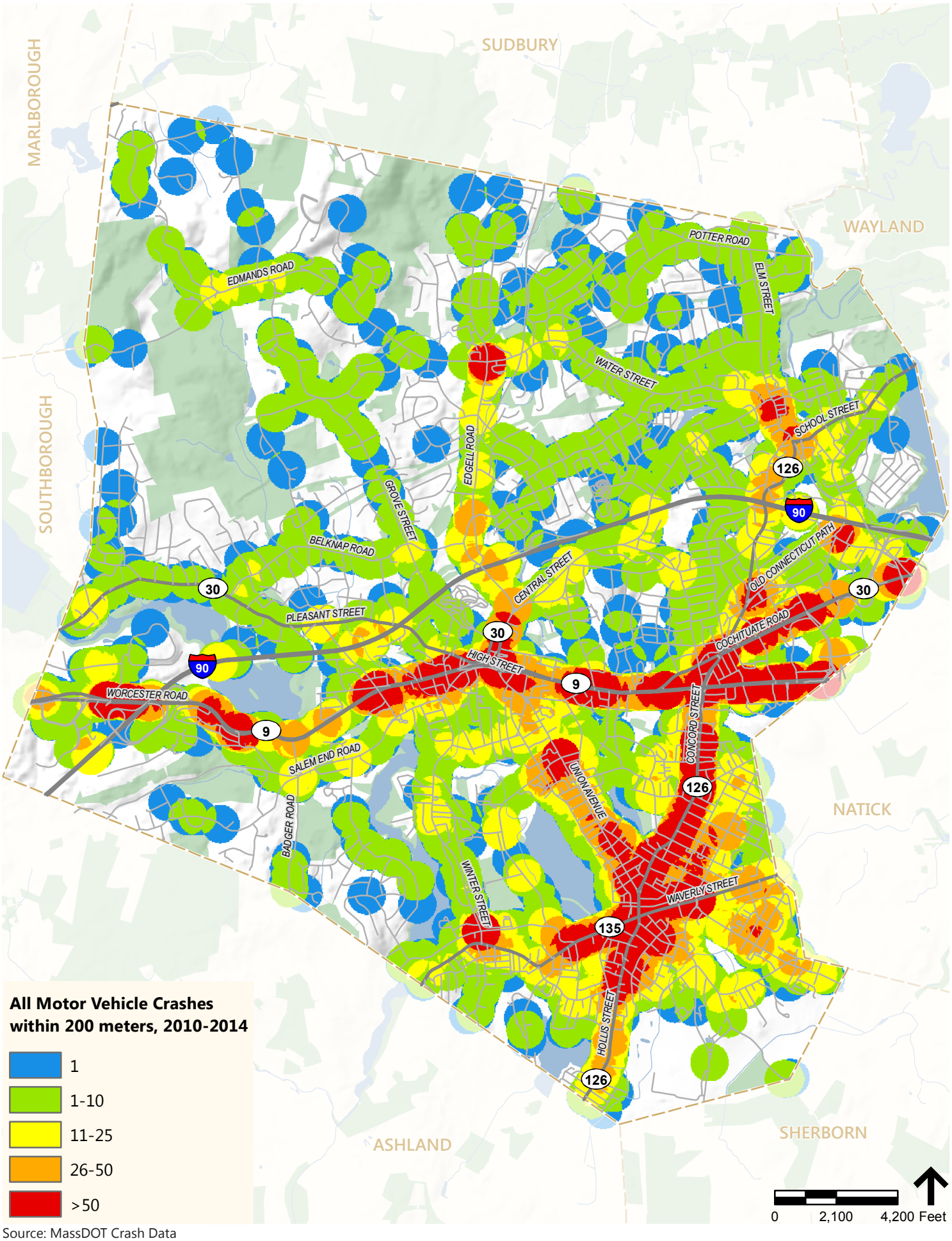
FIGURE 29: CRASH HOT SPOTS



Source: MassDOT Crash Data

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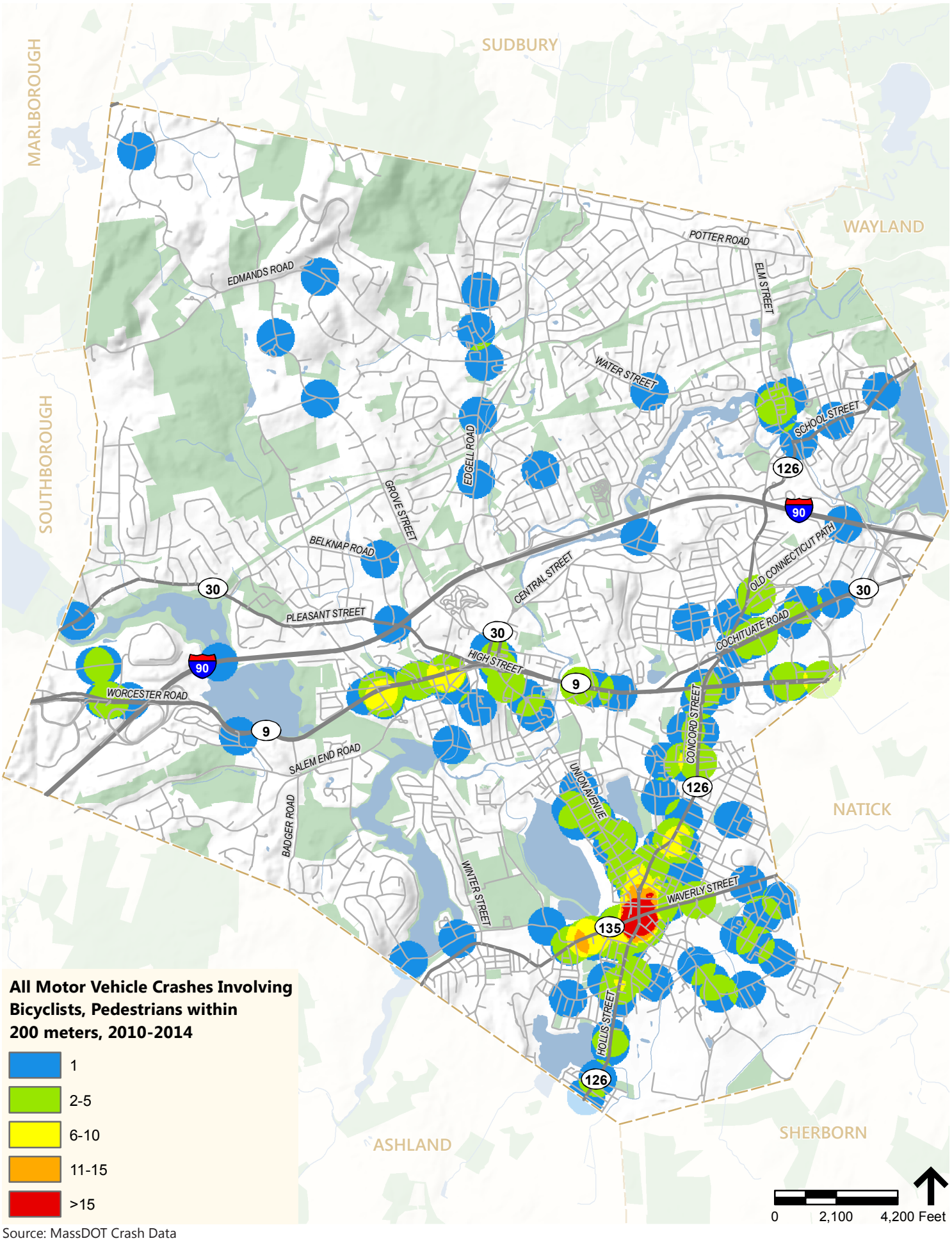
FIGURE 30: CRASHES INVOLVING CYCLISTS AND PEDESTRIANS



Source: MassDOT Crash Data

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Top 200 Crash Locations

MassDOT uses the crash data reported by the MassDOT Registry of Motor Vehicles (RMV) to identify the top 200 crash locations throughout the state. Locations are ranked by the number of equivalent property damage only (EPDO)[25] crashes contained within the cluster for the most recent three years of crash data available. Top pedestrian and bicycle locations lists are also published using the most recent ten years of crash data available. Figure 31 illustrates the Top 200 crash locations within Framingham.

Highway Safety Improvement Program (HSIP)

The Highway Safety Improvement Program (HSIP) is a Federal-aid program to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-state-owned roads[26]. The grant program is administered in Massachusetts by MassDOT and locations eligible for the funding program are those where the total number of EPDO crashes in the area is within the top 5% of all clusters in that region. Figure 31 illustrates the HSIP clusters within Framingham.

Roadside Safety Audits (RSAs) investigate safety issues and identify potential safety mitigation. The Commonwealth of Massachusetts, through HSIP, requires a RSA for HSIP-eligible locations. Within Framingham, RSAs have been completed at the following locations:

- Route 9 at Maynard Road
- Route 126 Downtown Corridor (Lincoln Street to Irving Street) – *this corridor was recently reconstructed and safety improvements included in the RSA were incorporated where appropriate.*
- Union Avenue at Lincoln Street/Myrtle Street and Union Avenue at Mt. Wayte Avenue/Buckminster Street – *as part of the Reconstruction of Union Avenue project[27] geometric and traffic signal phasing/timing improvements, and pedestrian and bicycle accommodations are being proposed along the corridor, which are consistent with some of the recommendations included in the RSA.*

A RSA report is completed for each location and includes detailed safety recommendations for short-, medium-, and long-term timeframes.

[25] "Equivalent property damage only" is a method of combining the numbers of crashes with the severity of the crashes based on a weighted scale. Crashes involving property damage only are reported at a minimal level of importance (1), crashes involving personal injury are weighted at a moderated level of importance (5), and crashes involving fatalities are weighted at a high level of importance (10).

[26] FHWA website: www.safety.fhwa.dot.gov/hsip. Accessed June 2017.

[27] Functional Design Report and 25% Design Submission completed by BETA Engineering in September 2015. The project is on the Massachusetts Transportation Improvement Program (TIP) for 2021.

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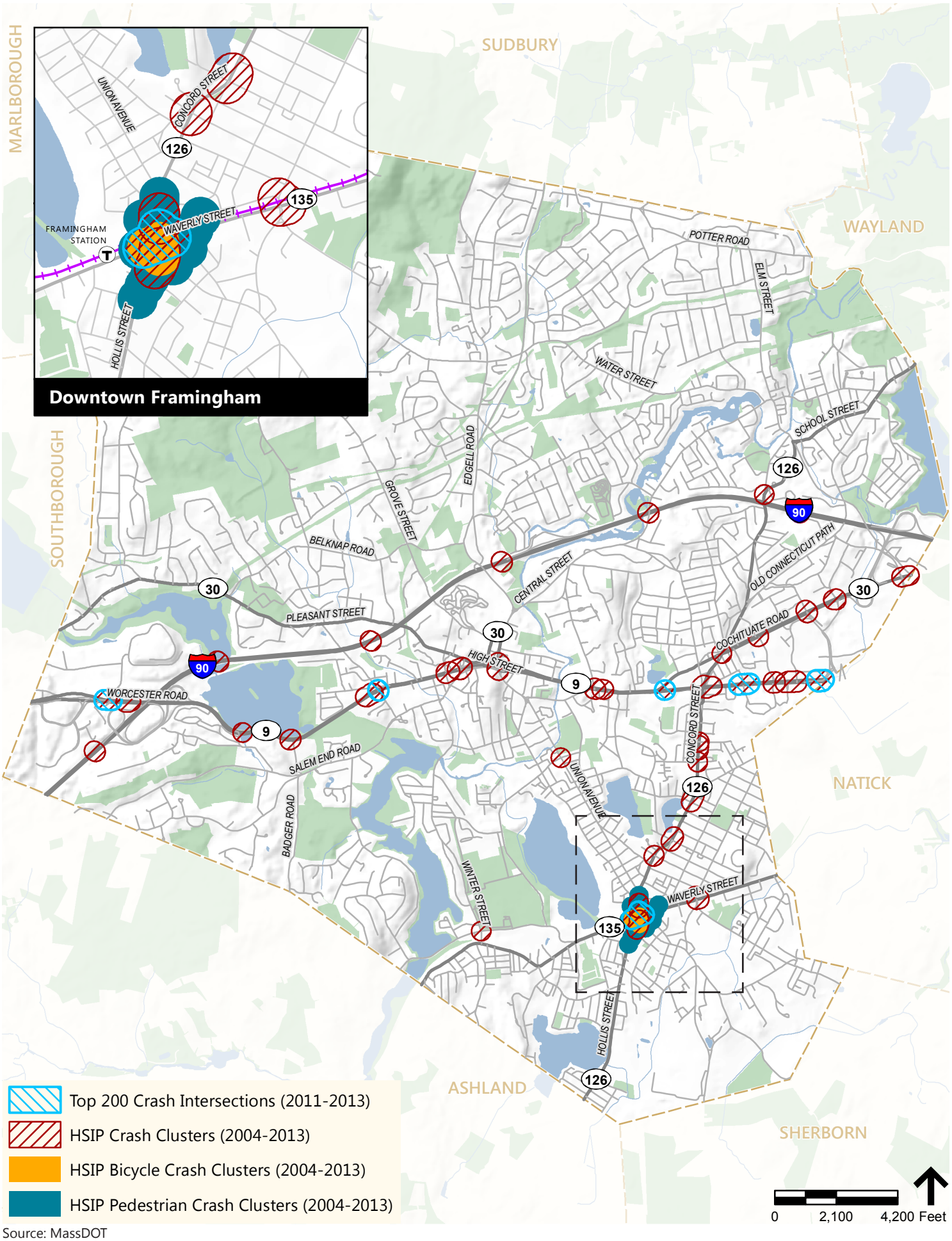
FIGURE 31: HSIP CLUSTERS AND TOP 200 INTERSECTION CRASH LOCATIONS



Source: MassDOT

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Crash Rates

For locations with available peak-period traffic volume data it is possible to calculate standardized crash rates. The calculation of crash rates is an effective tool to measure and compare the relative safety of a location to other similar locations. The combination of crash frequency (crashes per year) and vehicle exposure (traffic volumes or miles traveled) results in a crash rate. They are expressed as "crashes per Million Entering Vehicles" (MEV) for intersection locations and as "crashes per Million Vehicle Miles Traveled" (MVMT) for roadway segments.

By way of comparison, the 2016 MassDOT average crash rates for signalized and unsignalized intersections for District 3 (the MassDOT district designation for Framingham) are 0.90 and 0.65, respectively. A crash rate higher than the MassDOT rates indicate a higher than average crash tendency for a given facility or intersection. Locations with higher than average crash rates are listed in Table 5. Detailed crash analysis data are included in Appendix III.

Safety Deficiencies

Based on the crash data review for 2010 through 2014, safety issues were identified at the study intersections shown in Table 8. These issues include intersections with a calculated crash rate higher than the district average, ranked as a Top 200 intersection, HSIP cluster, and/or had one or more fatal crash or crash involving a non-motorist (bicyclist/pedestrian). These deficiencies are focused along the arterials (Routes 9, 30, and 126) in Framingham.

Table 8 Safety Deficiencies

Location	Crash Rate Higher than District Average[1]	Top 200 Intersection[2]	HSIP Cluster[3]	Fatal Injury[4]	Non-Motorist Crash[5]
Nobscot					
Edgell Road at Edmands Road/ Water Street	✓			✓	✓
Saxonville					
Central Street at Elm Street/ Concord Street					✓
Framingham Technology Park					
Route 9 at California Avenue		✓	✓	✓	✓
Route 9 at Country Club Lane			✓		✓
Salem End					
Salem End Road at Badger Road				✓	
Pheasant Hill					
Route 30 at Temple Street/ Woodmere Road	✓				
Framingham Centre					
Route 9 at Temple Street	✓	✓	✓	✓	✓
Route 9 at Route 30 ramps (east)			✓		
Route 30 WB ramps at Edgell Road			✓		✓
Route 9 EB ramp at High Street/State Street			✓		✓
Route 30 EB ramp/High Street at Edgell Road/Main Street	✓		✓		✓
Edgell Road at Vernon Street	✓				
Edgell Road at Central Street	✓				
Central Street at Fenwick Street/Haynes Road					✓
Route 9/30 at Main Street					✓
Route 9/30 at Prospect Street	✓		✓		✓

Location	Crash Rate Higher than District Average[1]	Top 200 Intersection[2]	HSIP Cluster[3]	Fatal Injury[4]	Non-Motorist Crash[5]
Framingham Mall/Shoppers World					
Route 30 at Route 126	✓		✓		
Route 30 at Whittier Street/ Shoppers World Drive			✓		✓
Route 30 at Burr Street			✓		✓
Route 30 at Speen Street	✓		✓		
Route 9 at Route 30		✓	✓		
Route 9 at Caldor Road			✓		✓
Route 9 at Ring Road (west)		✓	✓		✓
Route 9 at Ring Road (east)	✓	✓	✓		✓
Lokerville					
Route 126 at Hartford Street	✓				
Arthur Street at Grant Street	✓				
Arthur Street at Bishop Street	✓				
Downtown					
Route 126 at Union Avenue	✓		✓		✓
Route 126 at Howard Street	✓		✓		✓
Route 126 at Route 135	✓	✓	✓	✓	✓
Route 126 at Irving Street	✓		✓		✓
Bishop Street at Howard Street			✓		
Route 135 at Bishop Street/ Beaver Street	✓		✓		✓
South Framingham					
Irving Street at Herbert Street/Loring Drive					✓
Leland Street at Beaver Street/Kendall Avenue	✓				✓

Source: MassDOT crash portal, accessed July 2017.
1 Intersection crash rates are calculated based on number of crashes and intersection volume.
2 Intersection has an equivalent property damage only (EPDO) ranking within the top 200 in the state of Massachusetts.
3 Clusters are determined based on a combination of factors including crash incidence and severity.
4 At least one crash at the intersection resulted in a fatality.
5 At least one crash at the intersection involved a non-motorist (pedestrian or bicyclist).

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8

Parking

Framingham, with its mixed-use Downtown, major corporate business parks, regional commercial centers, educational and medical campuses, and residential neighborhoods, has to serve diverse parking needs. Developing parking strategies for Framingham can be challenging since the requirements of residents, employees, students, and visitors can vary greatly.

In addition to metered and unmetered on-street parking, Framingham operates three off-street public parking facilities, all located Downtown:

- Pearl Street Garage: 289 parking spaces sold by monthly permit.
- Waverly Street Commuter Lot: 65 parking spaces sold by monthly permit.
- Hollis Court Lot: 89 spaces available for daily parking on first come, first serve basis.

Parking is also provided at most commercial and retail centers within Framingham for customers and employees. Massport also operates a parking garage for its Logan Express service located in Shoppers World.

Several parking studies have been conducted for Framingham, with the latest prepared by Howard/Stein-Hudson Associates and Bravitz Community Planning &

Design, LLC (BCPD) in June 2014. This study focused on Downtown, the Golden Triangle, Route 9 Corridor, Technology Park, Exit 12 Office Parks, and neighborhood shopping centers.

The Howard/Stein-Hudson Associates and BCPD report focuses on parking strategies that will encourage the type of development desired by Framingham — for instance, transit oriented and, pedestrian/bicycle friendly development in Downtown — rather than on increasing parking supply.

Parking Strategies

The following strategies[28] are recommended to improve parking operations and achieve the development goals for Framingham. Many of these strategies have already been adopted in the May 2017 zoning by-law revisions including the expansion of the Central Business District for Downtown Framingham and the Highway Overlay District. These include:

- Modify zoning requirements to accommodate mixed-uses within certain districts (including future transit-oriented development in the downtown area).
- Manage parking supply through the use of shared parking to reduce overall requirements.
- Accommodate bicycle parking, especially in the downtown and neighborhood centers.
- Investigate sustainable paving and landscaping techniques for new or retrofitted lots.
- Encourage "Park Once", particularly in downtown.

The following strategies could be considered in addition to those already in place:

- Identify or create a single department within the City to determine an overall parking strategy prior to implementation of measures.
- Determine feasibility of retrofitting targeted redevelopment sites within infill development where parking is excessive and underutilized.
- Determine locations where structured parking might be appropriate.
- Determine effective time limits and pricing (considering smart meters that adjust pricing based on demand and/or time-of-day) on parking meters.
- Determine how to accommodate all-day commuter parking, potentially though a permit system.

[28] *Parking Regulations Report*, Town of Framingham, Massachusetts, Howard/Stein-Hudson Associates & Brovitz Community Planning & Design, LLC (BCPD), June 2014.

- Ensure pedestrian access and pedestrian safety.
- Better directional signage for parking.
- Evaluate feasibility of reducing minimum parking requirements in all zoning districts.
- Evaluate feasibility of introducing maximum parking requirements as opposed to minimum.
- Evaluate provision of on-street parking and utilization, effect on safety, speed, congestion, etc.
- Encourage “decoupling” of parking costs, requiring tenants to pay for spaces in TODs.
- Consider implementing parking benefit districts, where money collected from parking meters is used to implement projects (e.g., streetscape) within that district.

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9

Bridges

A total of 67 bridges are located in Framingham, of which thirty-three are owned by the City. The majority of the City-owned bridges are in satisfactory condition. Seven of the bridges are eligible for the MassDOT Small Bridge Program.

Greenman-Pederson, Inc. (GPI) prepared a comprehensive Citywide Bridge Inspection and Master Plan. The GPI report cataloged and documented each city-owned bridge, evaluated the condition of each structure and provided recommendations for maintenance and repairs. This report was reviewed and where feasible and necessary updated as part of the Phase 1 TMP.

Bridge Infrastructure

Framingham's 33 bridges are not evenly spread throughout the City, some communities have few to none such as Northwest Framingham and Nobscot. Figure 32 illustrates the locations of the Framingham owned bridges.

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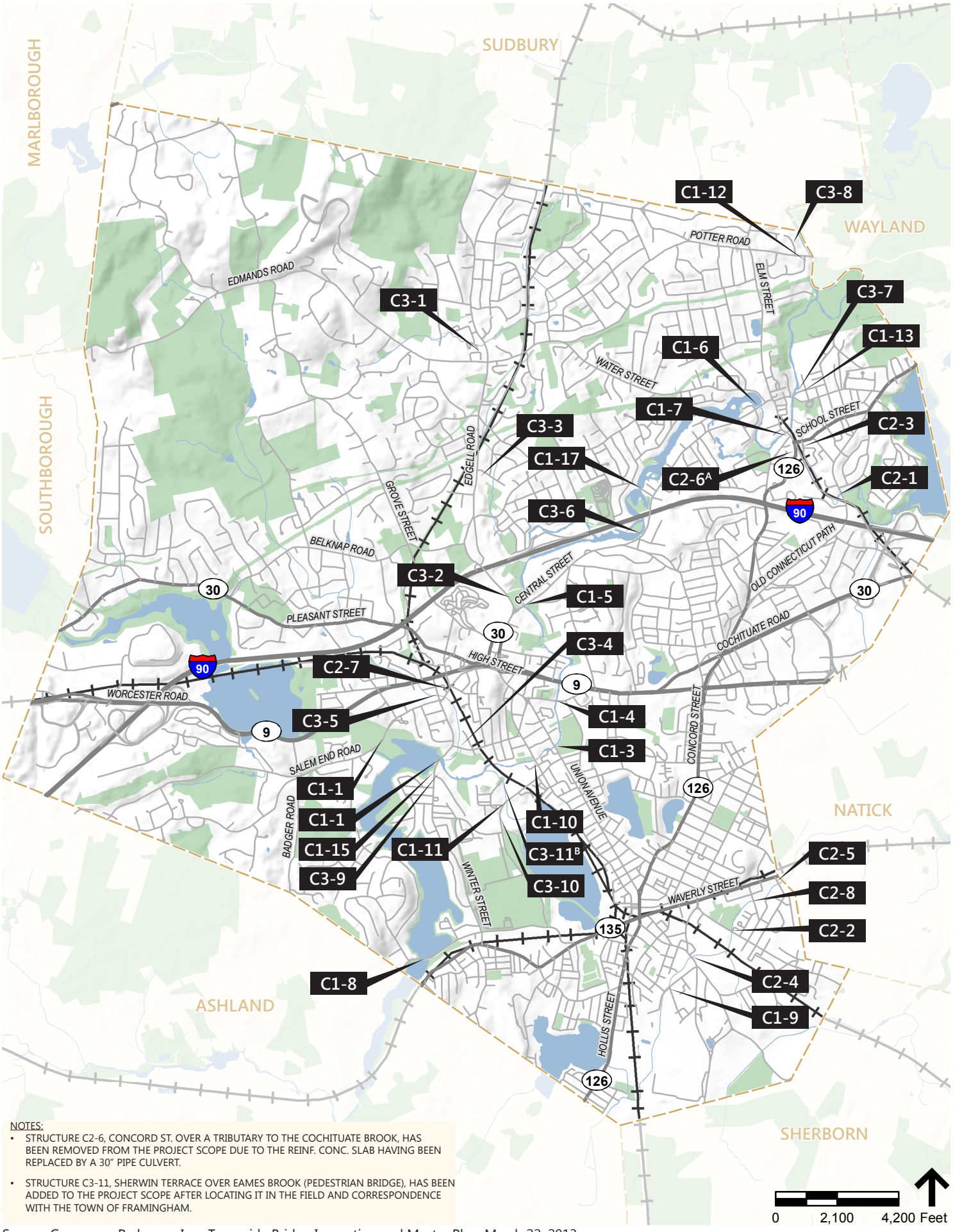
FIGURE 32: BRIDGE LOCATIONS



NOTES:

- STRUCTURE C2-6, CONCORD ST. OVER A TRIBUTARY TO THE COCHITUATE BROOK, HAS BEEN REMOVED FROM THE PROJECT SCOPE DUE TO THE REINF. CONC. SLAB HAVING BEEN REPLACED BY A 30" PIPE CULVERT.
- STRUCTURE C3-11, SHERWIN TERRACE OVER EAMES BROOK (PEDESTRIAN BRIDGE), HAS BEEN ADDED TO THE PROJECT SCOPE AFTER LOCATING IT IN THE FIELD AND CORRESPONDENCE WITH THE TOWN OF FRAMINGHAM.

Source: Greenman-Pederson, Inc., Townwide Bridge Inspection and Master Plan, March 22, 2013.

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The federal government created the National Bridge Inspection Standards (NBIS) in 1968 which established requirements for the inspection of all bridges including frequency, personnel qualifications, inspection reports, and inspection procedures. The NBIS apply to all structures defined as bridges, which per the federal government is any structure with a span length greater than 20 feet.

Massachusetts defines a bridge as any structure greater than 10 feet in length using the same measurement criteria as in NBIS. Structures greater than 10 feet in length but less than 20 feet in length are also designated as bridges while structures greater than 4 feet in length but less than 10 feet in length are considered culverts regardless of actual structure type.

The condition of each bridge component is rated on a scale of 0-9, as shown in Table 9, with 9 being the best rating and zero being the poorest rating. In general, a rating of 7-9 indicates the component is in "good" condition, a rating of 5-6 indicates the component is in "fair" condition, and a rating of 0-4 indicates the component is in "poor" condition.

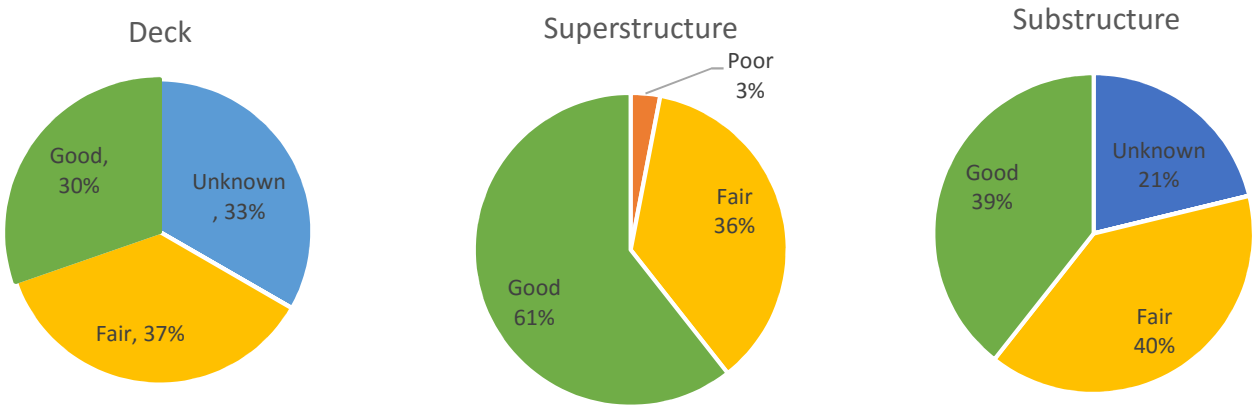
Table 9 Rating Scale

Condition	Rating
Good	7-9
Fair	5-6
Poor	0-4

The three main bridge components that are assigned condition ratings during an inspection are the deck, substructure and superstructure. These values are reported to the federal government if the structure qualifies as a bridge under the NBIS.

Graphic 10 below shows the condition ratings for all of the Framingham bridges.

Graphic 10 Bridge Ratings



MassDOT Small Bridge Program

In 2016 MassDOT launched the Municipal Small Bridge Program. This statewide program provides $50 million over a period of five years in the form of grants to municipalities to replace/rehabilitate municipally-owned bridges having a span length between 10 and 20 feet. The program is need and merit based with an emphasis on bridges with a critical need (emergency closure or detrimental detour routes for first responders). The maximum amount of reimbursement is $500,000 per year, per municipality. Seven bridges owned by Framingham meet the Small Bridge Program criteria, as shown in Table 10.

Table 10 Small Bridge Program Eligible Structures

			Condition Ratings		
ID	Bridge #	Location	Deck	Superstr.	Substr.
C2-1	F-07-013	Old Connecticut Path over Cochituate Brook	N/A	7	N/A
C2-2[1]	F-07-21	Beaver Street over Beaver Dam Brook	5	5	6
C2-3	F-07-022	School Street over Cochituate Brook	5	5	6
C2-4	F-07-025	Irving Street over Beaver Dam Brook	6	6	6
C2-5	F-07-026	Second Street over Beaver Dam Brook	6	6	6
C2-7	N/A	Salem End Road over Baiting Brook at Winter Street	N/A	7	N/A
C2-8	N/A	Taralli Terrace over Beaver Dam Brook	N/A	7	N/A

1 Bridge received a grant under the program in March 2017.
N/A Not available

Based on the eligible structures listed in Table 10 condition ratings, the bridge repair project which has the most potential to be funded under this program is F-07-022 – School Street over Cochituate Brook. The structure is currently load posted and has condition ratings for the deck and superstructure of 5. In addition, the structure is located on a heavily travelled road that serves residences, businesses and houses of worship. However, it is likely that more deficient structures in other communities with lower ratings will be given priority over this bridge.

All of the other structures have condition ratings of 6 or greater meaning the structures are currently in fair to good condition. Based on the stated goals of the Small Bridge Program and previous experience with the types of projects that received those grants, a grant application for these structures would likely not be successful. It should be noted the Beaver Street over Beaver Dam Brook bridge received a grant under the Small Bridge Program in March 2017.

Bridge Deficiencies

All of Framingham's bridges currently have condition ratings of fair or good. The one exception is bridge F-07-056 (C1-15) — Winter Street over Sudbury River — which underwent interim repairs in 2013 and the updated bridge rating is currently under MassDOT review. Some bridges, however, have a condition rating of 5. These include:

- F-07-022 (C1-1) – Salem End Road over Reservoir #1 (Stearns). In preliminary design.
- F-07-007 (C1-5) – Central Street over Sudbury River (by Edgell Road). The deck, which was the component with a rating of 5, was replaced in 2016.
- F-07-038 (C1-12) – Potter Road over Sudbury River.
- F-07-011 (C3-8) – Potter Road over Sudbury River Pedestrian. This bridge is a historic landmark that will not be removed or reopened and the Town of Sudbury is currently working to stabilize the bridge.
- F-07-021 (C2-2) – Beaver Street over Beaver Dam Brook. Received Small Bridge Program grant.
- F-07-022 (C2-3) – School Street over Cochituate Brook.

The Bridge Inventory Evaluation, included in Appendix I, includes one-, five-, and ten-year rehabilitation actions for all the bridges under the City's jurisdiction.

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Short-Term Improvement Recommendations

The following outlines immediate and short-term strategies aimed at mitigating or improving existing deficiencies previously identified.

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Table 11 Short-Term Improvement Recommendations

Improvement Category	Issue	Improvement	Description/Notes
Citywide			
Transit	Limited night and weekend service provided	Evaluate/monitor transit demand to determine if need is present	CTPS study underway which will help streamline/assess performance of MWRTA
Transit	Lack of bus stop amenities at most frequently used stops	Provide ADA accessible amenities including shelters, sidewalks, bicycle racks, posted schedules, etc.	Prioritize with a focus on accessibility and safety deficient locations first
Transit	Lack of schedule consistency between MBTA and MWRTA services	Review and modify schedules to allow for timely connections between services	Focus on weekday morning and evening commuter peak periods
Transit	MBTA commuter rail Framingham/Worcester Line trains are approaching capacity on several peak period trips	Explore opportunities to provide service adjustments and/or higher capacity trains during peak periods	Coordinate with the MBTA to identify potential Framingham/Worcester Line improvement opportunities
Transit	Limited MBTA commuter rail Framingham/Worcester Line service in non-peak directions during peak periods	Explore opportunities to provide increased service for non-peak directions during peak periods	Coordinate with the MBTA to identify potential Framingham/Worcester Line improvement opportunities
Transit	Limited services provided by the MetroWest/495 TMA	Work with MetroWest/495 TMA and local employers to provide services and incentives for employees, including shuttles, subsidized transit passes, etc.	MetroWest/495 TMA has a desire to improve services in the future to support the region.
Pedestrian	Missing sidewalk segments and non-ADA compliant and "missing" pedestrian ramps	Connect missing sidewalk segments and install/reconstruct wheelchair ramps to be ADA compliant	Consistent with the Town Sidewalk Accessibility Study[29], use the GIS database to prioritize with a focus on non-compliant, missing segments, and deteriorated locations. Focus on arterial roadways and high priority areas identified in the Bicycle & Pedestrian Plan[30].

[29] *Town Sidewalk Accessibility Study*, Framingham, Massachusetts, VHB, Inc., March 2016.

[30] *Framingham Bicycle & Pedestrian Plan*, Division of Community & Economic Development, 2017.

Improvement Category	Issue	Improvement	Description/Notes
Citywide			
Pedestrian	Narrow sidewalks or having obstructions	When reconstructing sidewalks, build at an appropriate width and relocate obstructions.	Use Framingham's GIS database of all the sidewalks to determine locations in need of improvements and keep track of sidewalk conditions.
Bicycle	Lack of facilities along/adjacent to major corridors and limited connectivity between facilities	Construct/expand bicycle facilities	Focus on arterial roadways and high priority areas identified in the Bicycle & Pedestrian Plan[31]
Bicycle	Limited information along some roads and trails	Conduct data collection efforts with a focus of capturing both bicycle commuter peak and recreational times	Focus on Cochituate Rail Trail and Dudley-Mt. Wayte Multi-use Path
Pedestrian/ Bicycle	Poor condition/lack of accommodations at intersections	Recommend future intersection improvement projects to incorporate pedestrian and bicycle accommodations	Refer to Framingham's Complete Streets Policy[32] and Bicycle & Pedestrian Plan[31] for design standards
Parking	Parking location and supply not aligned with community goals	Designate a Parking Task Force to prioritize and implement parking strategies and plan for long-term growth	Refer to detailed strategies and recommendations provided in *Parking Regulations Report*[33].
Route 9 (Worcester Road)			
Auto/Safety/ Transit	Congestion during peak commuter periods, a high number of crashes, and low on-time performance for MWRTA bus routes	Evaluate signal enhancements to improve progression along the corridor and reduce congestion, including expanding the adaptive signal system to additional locations	A five-signal adaptive signal system was installed in Spring 2017 from Caldor Road to Natick Mall Road. Route 9 is under MassDOT jurisdiction and the City should coordinate improvements with MassDOT.

[31] *Framingham Bicycle & Pedestrian Plan*, Division of Community & Economic Development, 2017.

[32] *Policy on Complete Streets*, Town of Framingham Board of Selectmen, January 6, 2015.

[33] *Parking Regulations Report*, Town of Framingham, Massachusetts, Howard/Stein-Hudson Associates, June 2014.

Improvement Category	Issue	Improvement	Description/Notes
Route 9 (Worcester Road)			
Safety	High number of crashes	Conduct RSAs at HSIP-eligible locations to identify safety enhancements, and at locations where RSAs have been conducted, implement short-term safety enhancements.	A RSA was conducted at Route 9 (Worcester Road) at Maynard Road[34]. Route 9 is under MassDOT jurisdiction and the City should coordinate improvements with MassDOT.
Route 30 (Cochituate Road)			
Pedestrian/ Bicycle/ Safety	Gaps in accommodations	Connect sidewalk segments and provide connections to the Cochituate Rail Trail	Detailed recommendations in the Route 30 Study[35]. The TJX and Cochituate Rail Trail Phase 2 projects include improvements to fill these gaps.
Auto/Safety	Congestion during peak commuter periods and a high number of crashes	Retime/optimize traffic signal timings; Evaluate driveway access/spacing	Refer to detailed recommendations in the Route 30 Study
Safety	High number of crashes	Conduct RSAs at HSIP-eligible locations to identify safety enhancements	
Northwest Framingham			
Transit	No MWRTA service provided	Evaluate the need and desire line(s)	Monitor demand and if/when warranted, provide service along appropriate roadways.
Pedestrian/ Safety	Limited sidewalk connectivity	Evaluate the need and desire line(s)	Monitor demand and if/when warranted, provide ADA compliant sidewalk connections and wheelchair ramps along appropriate roadways.
Auto/Safety	Speeding	Develop traffic calming strategy	An areawide traffic calming evaluation consistent with Framingham's Policy on Traffic Calming Measures[36] is being conducted.

[34] *Road Safety Audit, Route 9 (Worcester Road) at Maynard Road*, Town of Framingham, March 2013.

[35] *Route 30 Arterial Segment Study in Framingham and Natick*, Boston Region Metropolitan Planning Organization, October 17, 2013.

[36] *Policy on Traffic Calming Measures*, Town of Framingham, January 15, 2013.

Improvement Category	Issue	Improvement	Description/Notes
Nobscot			
Bridge	Bridge F-07-038 (C1-12), Potter Road over Sudbury River, has a close to poor bridge rating	Conduct maintenance including; install membrane waterproofing, repave, eliminate deck joint at pier, clean & paint steel bearings, and seal beam ends	Based on the bridge inventory evaluation, the bridge should be replaced within 5 years. The bridge is not eligible for grants under MassDOT's Small Bridge Program. Both Wayland and Framingham own the bridge and improvements would need to be coordinated.
Saxonville			
Bridge	Bridge F-07-022 (C2-3), School Street over Cochituate Brook, has a close to poor bridge rating	Seek funding through the State Transportation Improvement Program (STIP) or MassDOT Small Bridge Program to replace the bridge	Based on the bridge inventory evaluation, the bridge should be replaced within 10 years
Framingham Centre/Edgell Road			
Auto/ Pedestrian/ Bicycle	Congestion during peak commuter periods	Complete improvements to intersections along the corridor and incorporate pedestrian and bicycle accommodations	Improvements identified in Main Street Improvements[37] and Edgell Road Complete Streets[38] studies.
Salem End			
Pedestrian	Limited sidewalk connectivity and pedestrian accommodations at signalized intersections	Evaluate the need and desire line(s)	Monitor demand and if/when warranted, provide ADA compliant sidewalk connections and wheelchair ramps along appropriate roadways and pedestrian phasing at signalized intersections.
Auto	Poor intersection operations and atypical intersection geometry at Salem End Road/Gates Street/Badger Road	Seek funding through the STIP to complete intersection improvements	The City prepared and submitted a STIP application in 2016, which identified a roundabout at this intersection as the preferred alternative

[37] *Main Street Improvements*, Green International Affiliates, Inc., October 14, 2016.

[38] *Edgell Road Complete Streets Assessment DRAFT*, VHB Inc., December 2016.

Improvement Category	Issue	Improvement	Description/Notes
Salem End			
Bridge	Bridge F-07-022 (C1-1), Salem End Road over Reservoir #1 (Stearns), has a close to poor bridge rating	Rehabilitate bridge	Currently in preliminary design
Downtown			
Bicycle	Lack of facilities and limited connectivity with high bicycle usage	Construct/expand bicycle facilities	Focus on high priority areas identified in the Bicycle & Pedestrian Plan. Recent reconstruction of Route 126 in Downtown included bicycle accommodations.
Safety	High number of crashes	Conduct RSAs at HSIP-eligible locations to identify safety enhancements	RSAs were conducted at Route 126 Downtown Corridor[39] and at Union Avenue at Lincoln Street/Myrtle Street and at Mt. Wayte Avenue/Buckminster Street[40].

[39] *Road Safety Audit, Route 126 Downtown Corridor (Lincoln Street to Irving Street)*, Town of Framingham, October 2012.

[40] *Road Safety Audit, Union Avenue at Lincoln Street/Myrtle Street, Union Avenue at Mt. Wayte Avenue/Buckminster Street*, Town of Framingham, July 9, 2015.

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